

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis

13715 Rider Trail North

Earth City, MO 63045

Tel: (314)298-8566

TestAmerica Job ID: 160-18504-1

Client Project/Site: ORNL Y-12 Outfall 200 Characterization

For:

Alliant Corporation

320 N Cedar Bluff Road

Suite 200

Knoxville, Tennessee 37923

Attn: Doug Milloway

Authorized for release by:

8/29/2016 11:11:59 AM

Erika Gish, Project Manager II

(314)298-8566

erika.gish@testamericainc.com

LINKS

Review your project
results through

TotalAccess

Have a Question?

Ask
The
Expert

Visit us at:

www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	7
Receipt Checklists	8
Definitions/Glossary	9
Method Summary	10
Sample Summary	11
Detection Summary	12
Client Sample Results	13
QC Sample Results	25
QC Association Summary	40
Surrogate Summary	46
Tracer Carrier Summary	49
Subcontract Data	52

Case Narrative

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Job ID: 160-18504-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Alliant Corporation

Project: ORNL Y-12 Outfall 200 Characterization

Report Number: 160-18504-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 8/5/2016 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.6° C.

TCLP VOLATILE ORGANIC COMPOUNDS (GC-MS)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for TCLP volatile organic compounds (GC-MS) in accordance with EPA SW846 Method 1311/8260C. The samples were leached on 08/08/2016 and analyzed on 08/10/2016.

The following compound did not meet the minimum relative response factor limits in the continuing calibration verification (CCV): 2-Butanone (MEK). A low-level LOQV was analyzed at the reporting limit (5ug/L) and the affected analyte was detected. Target analytes recovering above the reporting limit will be qualified and reported. (CCVIS 160-264101/2)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP SEMIVOLATILE ORGANIC COMPOUNDS (GC-MS)

Case Narrative

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Job ID: 160-18504-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for TCLP semivolatile organic compounds (GC-MS) in accordance with EPA SW-846 Methods 1311 / 8270D. The samples were leached on 08/09/2016, prepared on 08/12/2016 and analyzed on 08/15/2016.

2,4,6-Tribromophenol (Surr) recovery for the following sample was outside the upper control limit: (LB 160-264502/1-B). The samples did not contain any target analytes; therefore, re-extraction and/or re-analysis was not performed.

The laboratory control sample (LCS) and matrix spike (MS) recovered outside control limits for the following analyte: Hexachlorobenzene. This analyte was biased high in the LCS and MS and was not detected in the associated samples; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

POLYCHLORINATED BIPHENYLS (PCBs)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for polychlorinated biphenyls (PCBs) in accordance with EPA SW-846 Method 8082. The samples were prepared on 08/15/2016 and analyzed on 08/19/2016.

Surrogate recovery for the following sample was outside control limits for the confirmation column; however was within QC limits for the primary column: YMTFA40SE001 (160-18504-2). Evidence of matrix interference is present; therefore, the primary analysis was reported.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries were outside control limits for PCB-1016 from the primary column. Sample matrix interference is suspected because the associated laboratory control sample (LCS) and MS/MSD recoveries for the confirmation column were within acceptance limits. The confirmation analyzes which were the lower values and were within the QC limits are reported.

The %RPD between the primary and confirmation column exceeded 40% for DCB Decachlorobiphenyl (Surr) for the following MS: (160-18504-E-1-B MS). The surrogate recoveries were within the QC limits; therefore, re-analysis was not warranted. The lower value has been reported and qualified in accordance with the laboratory's SOP.

The %RPD between the primary and confirmation column exceeded 40% for PCB-1016 for the following MS/MSD: (160-18504-E-1-B MS) and (160-18504-E-1-C MSD). PCB-1016 recoveries were within the QC limits; therefore, re-analysis was not warranted. The lower value has been reported and qualified in accordance with the laboratory's SOP.

The following MS/MSD contained PCB-1254 with co-elution of PCB-1016 and PCB-1260 to quantify individually. The PCBs present are quantified as the predominant Aroclor:

EPA Method 8082/8082A requires a minimum of 3 peaks to be used for PCB quantitation. Due to the presence of multiple aroclors in the following samples, less than 5 peaks were used for quantitation. YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3), YMTFA73SE001 (160-18504-4), (160-18504-E-1-B MS) and (160-18504-E-1-C MSD)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP CHLORINATED HERBICIDES

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for TCLP chlorinated herbicides in accordance with SW- 846 Method 9315. The samples were leached on 08/09/2016, prepared on 08/12/2016 and analyzed on 08/18/2016.

The CCV recovery for 2,4-D is outside the upper QC limits on the secondary column, but is within the acceptable QC limits on the primary column. There were no hits above the RL on the primary column; thus confirmation was not needed on the secondary column. The data results will be reported from the primary column. (CCV 160-265408/15)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TCLP METALS (ICP)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for TCLP metals (ICP) in accordance with EPA SW-846 Method 1311/6010C. The samples were leached on

Case Narrative

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Job ID: 160-18504-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

08/09/2016, prepared on 08/15/2016 and analyzed on 08/16/2016.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

TCLP MERCURY

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for TCLP mercury in accordance with EPA SW-846 Methods 1311/7470A. The samples were leached on 08/09/2016, prepared on 08/16/2016 and analyzed on 08/17/2016.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

PERCENT SOLIDS

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for percent solids in accordance with EPA Method 160.3 MOD. The samples were analyzed on 08/09/2016.

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

ISOTOPIC AMERICIUM 241 (ALPHA SPECTROMETRY)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Isotopic Curium and/or Americium 241 (Alpha Spectrometry) in accordance with A-01-R. The samples were leached on 08/08/2016, prepared on 08/09/2016 and analyzed on 08/16/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3), YMTFA73SE001 (160-18504-4) and (160-18504-F-1-A DU). The sample contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC NEPTUNIUM (ALPHA SPECTROMETRY)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Isotopic Neptunium (Alpha Spectrometry) in accordance with A-01-R. The samples were leached on 08/08/2016, prepared on 08/09/2016 and analyzed on 08/12/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3), YMTFA73SE001 (160-18504-4) and (160-18504-F-1-A DU). The sample contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were leached on 08/08/2016, prepared on 08/09/2016 and analyzed on 08/12/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3), YMTFA73SE001 (160-18504-4) and (160-18504-F-1-A DU). The sample contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC THORIUM (ALPHA SPECTROMETRY)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R_Th. The samples were leached on 08/08/2016, prepared on 08/09/2016 and analyzed on 08/12/2016 and 08/15/2016.

Case Narrative

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Job ID: 160-18504-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3), YMTFA73SE001 (160-18504-4) and (160-18504-F-1-A DU). The sample contained rocks.

The thorium-229 tracer recovery for the following sample (28.7%) was low outside the QC limits of 30%: YMTFA73SE001 (160-18504-4). The DOE/DOD Quality Systems Manual for Environmental Laboratories (QSM Rev. 5.0) allows for reporting results as quantitative when tracer recoveries are below 30% if a) the relative uncertainty associated with the tracer recovery is less than 10% (2 sigma), b) spectral resolution requirements are met and there are no indications of spectral interferences, and c) detection limit requirements are met. All three of these criteria are met for these samples: a) a minimum of 400 counts (which leads to 10% count uncertainty at 2 sigma) in the tracer peak, b) resolution of < 100 keV is met for all peaks, and c) the activity in the sample is well above the MDC. The data have been qualified and reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were leached on 08/08/2016, prepared on 08/09/2016 and analyzed on 08/15/2016 and 08/16/2016.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3), YMTFA73SE001 (160-18504-4) and (160-18504-F-1-A DU). The sample contained rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TRITIUM

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Tritium in accordance with DOE. The samples were prepared on 08/16/2016 and analyzed on 08/18/2016.

The matrix spike (MS- 63%) recovery is outside the lower control limit of 78%. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits. The data have been qualified and reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TOTAL BETA STRONTIUM (GFPC)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Total Beta Strontium (GFPC) in accordance with SR-03-RC. The samples were leached on 08/08/2016, prepared on 08/10/2016 and 08/15/2016 and analyzed on 08/15/2016 and 08/17/2016.

Sample precipitated nothing during final clean up and was seeded with Ba carrier: YMTFA41SE001 (160-18504-3).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

TECHNETIUM-99 (LSC)

Samples YMTFA39SE001 (160-18504-1), YMTFA40SE001 (160-18504-2), YMTFA41SE001 (160-18504-3) and YMTFA73SE001 (160-18504-4) were analyzed for Technetium-99 (LSC) in accordance with TC_02_RC. The samples were prepared on 08/11/2016 and analyzed on 08/16/2016.

These soil and rock samples had a discoloration after the resin extraction that may cause quenching: YMTFA39SE001 (160-18504-1) and YMTFA73SE001 (160-18504-4).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Login Sample Receipt Checklist

Client: Alliant Corporation

Job Number: 160-18504-1

Login Number: 18504

List Source: TestAmerica St. Louis

List Number: 1

Creator: Clarke, Jill C

Question	Answer	Comment	
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True		6
The cooler's custody seal, if present, is intact.	True		7
Sample custody seals, if present, are intact.	N/A		8
The cooler or samples do not appear to have been compromised or tampered with.	True		9
Samples were received on ice.	True		10
Cooler Temperature is acceptable.	True		11
Cooler Temperature is recorded.	True		12
COC is present.	True		13
COC is filled out in ink and legible.	True		14
COC is filled out with all pertinent information.	True		15
Is the Field Sampler's name present on COC?	True		
There are no discrepancies between the containers received and the COC.	True		
Samples are received within Holding Time (excluding tests with immediate HTs)	True		
Sample containers have legible labels.	True		
Containers are not broken or leaking.	True		
Sample collection date/times are provided.	True		
Appropriate sample containers are used.	True		
Sample bottles are completely filled.	True		
Sample Preservation Verified.	True		
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True		
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A		
Multiphasic samples are not present.	True		
Samples do not require splitting or compositing.	True		
Residual Chlorine Checked.	N/A		

Definitions/Glossary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

GC/MS Semi VOA

Qualifier	Qualifier Description
N	MS, MSD: Spike recovery is outside acceptance limits.
U	Undetected at the Limit of Detection.
N	LCS, LCSD: Recovery exceeds upper or lower control limits.
S	Surrogate is outside control limits

GC Semi VOA

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

Metals

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
J	Estimated: The analyte was positively identified; the quantitation is an estimation

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.
N	MS, MSD: Spike recovery is outside acceptance limits.
S	Tracer is outside acceptance limits.

Glossary

Abbreviation

These commonly used abbreviations may or may not be present in this report.

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL SL
8270D	Semivolatile Organic Compounds (GC/MS)	SW846	TAL SL
8082A	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	SW846	TAL SL
8151A	Herbicides (GC)	SW846	TAL SL
6010C	Metals (ICP)	SW846	TAL SL
7470A	Mercury (CVAA)	SW846	TAL SL
Moisture	Percent Moisture	EPA	TAL SL
A-01-R	Isotopic Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Curium and/or Americium 241 (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Plutonium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Thorium (Alpha Spectrometry)	DOE	TAL SL
H3-04-RC	Tritium (LSC)	DOE	TAL SL
SR-03-RC	Total Beta Strontium (GFPC)	DOE	TAL SL
TC-02-RC	Technetium-99 (LSC)	DOE	TAL SL
C-14	General Sub Contract Method	NONE	TAL RCH

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

NONE = NONE

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL RCH = TestAmerica Richland, 2800 George Washington Way, Richland, WA 99352, TEL (509)375-3131

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-18504-1	YMTFA39SE001	Solid	08/04/16 09:00	08/05/16 10:00
160-18504-2	YMTFA40SE001	Solid	08/04/16 12:40	08/05/16 10:00
160-18504-3	YMTFA41SE001	Solid	08/04/16 13:25	08/05/16 10:00
160-18504-4	YMTFA73SE001	Solid	08/04/16 14:00	08/05/16 10:00

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

TestAmerica St. Louis

Detection Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA39SE001

Lab Sample ID: 160-18504-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	0.30		0.033	0.0079	mg/Kg	1		8082A	Total/NA
PCB-1260	0.17		0.033	0.0079	mg/Kg	1		8082A	Total/NA
Polychlorinated biphenyls, Total	0.47		0.033	0.0079	mg/Kg	1		8082A	Total/NA
Barium	0.95		0.13	0.038	mg/L	1		6010C	TCLP
Cadmium	0.0060 J		0.013	0.0038	mg/L	1		6010C	TCLP
Mercury	0.0042		0.0010	0.000079	mg/L	1		7470A	TCLP

Client Sample ID: YMTFA40SE001

Lab Sample ID: 160-18504-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	0.43		0.033	0.0080	mg/Kg	1		8082A	Total/NA
PCB-1260	0.29		0.033	0.0080	mg/Kg	1		8082A	Total/NA
Polychlorinated biphenyls, Total	0.73		0.033	0.0080	mg/Kg	1		8082A	Total/NA
Barium	1.0		0.13	0.038	mg/L	1		6010C	TCLP
Cadmium	0.0048 J		0.013	0.0038	mg/L	1		6010C	TCLP
Lead	0.013 J		0.025	0.0075	mg/L	1		6010C	TCLP
Mercury	0.0011		0.0010	0.000079	mg/L	1		7470A	TCLP

Client Sample ID: YMTFA41SE001

Lab Sample ID: 160-18504-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	0.81		0.033	0.0080	mg/Kg	1		8082A	Total/NA
PCB-1260	0.36		0.033	0.0080	mg/Kg	1		8082A	Total/NA
Polychlorinated biphenyls, Total	1.2		0.033	0.0080	mg/Kg	1		8082A	Total/NA
Barium	1.2		0.13	0.038	mg/L	1		6010C	TCLP
Cadmium	0.026		0.013	0.0038	mg/L	1		6010C	TCLP
Chromium	0.0098 J		0.025	0.0075	mg/L	1		6010C	TCLP
Lead	0.24		0.025	0.0075	mg/L	1		6010C	TCLP
Mercury	0.0024		0.0010	0.000079	mg/L	1		7470A	TCLP

Client Sample ID: YMTFA73SE001

Lab Sample ID: 160-18504-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
PCB-1254	0.66		0.033	0.0080	mg/Kg	1		8082A	Total/NA
PCB-1260	0.32		0.033	0.0080	mg/Kg	1		8082A	Total/NA
Polychlorinated biphenyls, Total	0.99		0.033	0.0080	mg/Kg	1		8082A	Total/NA
Barium	0.93		0.13	0.038	mg/L	1		6010C	TCLP
Cadmium	0.010 J		0.013	0.0038	mg/L	1		6010C	TCLP
Mercury	0.0016		0.0010	0.000079	mg/L	1		7470A	TCLP

This Detection Summary does not include radiochemical test results.

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA39SE001

Lab Sample ID: 160-18504-1

Matrix: Solid

Date Collected: 08/04/16 09:00

Date Received: 08/05/16 10:00

Method: 8260C - Volatile Organic Compounds by GC/MS - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	0.0037	U	0.050	0.0037	mg/L			08/10/16 01:48	1
1,2-Dichloroethane	0.0037	U	0.050	0.0037	mg/L			08/10/16 01:48	1
2-Butanone (MEK)	0.0039	U	0.050	0.0039	mg/L			08/10/16 01:48	1
Benzene	0.0025	U	0.050	0.0025	mg/L			08/10/16 01:48	1
Carbon tetrachloride	0.0036	U	0.050	0.0036	mg/L			08/10/16 01:48	1
Chlorobenzene	0.0038	U	0.050	0.0038	mg/L			08/10/16 01:48	1
Chloroform	0.00092	U	0.050	0.00092	mg/L			08/10/16 01:48	1
Tetrachloroethene	0.0028	U	0.050	0.0028	mg/L			08/10/16 01:48	1
Trichloroethene	0.0029	U	0.050	0.0029	mg/L			08/10/16 01:48	1
Vinyl chloride	0.0043	U	0.10	0.0043	mg/L			08/10/16 01:48	1
Surrogate	%Recovery	Qualifier		Limits			Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97			84 - 120				08/10/16 01:48	1
1,2-Dichloroethane-d4 (Surr)	105			83 - 117				08/10/16 01:48	1
Toluene-d8 (Surr)	97			85 - 115				08/10/16 01:48	1
Dibromofluoromethane (Surr)	97			85 - 115				08/10/16 01:48	1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 21:29	1
2,4-Dinitrotoluene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 21:29	1
Hexachlorobenzene	0.0050	U N	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 21:29	1
Hexachlorobutadiene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 21:29	1
Hexachloroethane	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 21:29	1
2-Methylphenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 21:29	1
3 & 4 Methylphenol	0.0050	U	0.10	0.0050	mg/L		08/12/16 15:52	08/15/16 21:29	1
Nitrobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 21:29	1
Pentachlorophenol	0.010	U	0.25	0.010	mg/L		08/12/16 15:52	08/15/16 21:29	1
Pyridine	0.025	U	0.10	0.025	mg/L		08/12/16 15:52	08/15/16 21:29	1
2,4,5-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 21:29	1
2,4,6-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 21:29	1
Surrogate	%Recovery	Qualifier		Limits			Prepared	Analyzed	Dil Fac
2,4,6-Tribromophenol (Surr)	83			49 - 100			08/12/16 15:52	08/15/16 21:29	1
Nitrobenzene-d5 (Surr)	85			51 - 98			08/12/16 15:52	08/15/16 21:29	1
Phenol-d5 (Surr)	76			37 - 95			08/12/16 15:52	08/15/16 21:29	1
Terphenyl-d14 (Surr)	108			60 - 113			08/12/16 15:52	08/15/16 21:29	1
2-Fluorobiphenyl (Surr)	85			45 - 94			08/12/16 15:52	08/15/16 21:29	1
2-Fluorophenol (Surr)	77			46 - 92			08/12/16 15:52	08/15/16 21:29	1

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.0095	U	0.033	0.0095	mg/Kg		08/15/16 11:07	08/19/16 14:35	1
PCB-1221	0.0095	U	0.033	0.0095	mg/Kg		08/15/16 11:07	08/19/16 14:35	1
PCB-1232	0.0095	U	0.033	0.0095	mg/Kg		08/15/16 11:07	08/19/16 14:35	1
PCB-1242	0.0095	U	0.033	0.0095	mg/Kg		08/15/16 11:07	08/19/16 14:35	1
PCB-1248	0.0095	U	0.033	0.0095	mg/Kg		08/15/16 11:07	08/19/16 14:35	1
PCB-1254	0.30			0.0079	mg/Kg		08/15/16 11:07	08/19/16 14:35	1
PCB-1260	0.17			0.0079	mg/Kg		08/15/16 11:07	08/19/16 14:35	1
PCB-1262	0.0079	U	0.033	0.0079	mg/Kg		08/15/16 11:07	08/19/16 14:35	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA39SE001

Lab Sample ID: 160-18504-1

Matrix: Solid

Date Collected: 08/04/16 09:00

Date Received: 08/05/16 10:00

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Polychlorinated biphenyls, Total	0.47		0.033	0.0079	mg/Kg				1
PCB-1268	0.0079	U	0.033	0.0079	mg/Kg				1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>DCB Decachlorobiphenyl (Sur)</i>	104		23 - 146				08/15/16 11:07	08/19/16 14:35	1

Method: 8151A - Herbicides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.020	U	0.040	0.020	mg/L				1
Silvex (2,4,5-TP)	0.0030	U	0.010	0.0030	mg/L				1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>2,4-Dichlorophenylacetic acid</i>	96		56 - 147				08/12/16 16:02	08/18/16 15:47	1

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.010	U	0.025	0.010	mg/L				1
Barium	0.95		0.13	0.038	mg/L				1
Cadmium	0.0060	J	0.013	0.0038	mg/L				1
Chromium	0.0075	U	0.025	0.0075	mg/L				1
Lead	0.0075	U	0.025	0.0075	mg/L				1
Selenium	0.013	U	0.038	0.013	mg/L				1
Silver	0.0075	U	0.025	0.0075	mg/L				1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0042		0.0010	0.000079	mg/L				1

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Americium-241	0.123		0.0591	0.0606	1.00	0.0617	pCi/g	08/09/16 10:32	08/16/16 16:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Americium-243</i>	78.0		30 - 110					08/09/16 10:32	08/16/16 16:19	1

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Neptunium-237	0.0245	U	0.0352	0.0352	1.00	0.0593	pCi/g	08/09/16 10:28	08/12/16 16:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Neptunium-239</i>	103		30 - 110					08/09/16 10:28	08/12/16 16:30	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
Plutonium-238	0.313		0.0988	0.102	1.00	0.0658	pCi/g	08/09/16 10:32	08/12/16 16:27	1
Plutonium-239/240	0.0669		0.0462	0.0465	1.00	0.0447	pCi/g	08/09/16 10:32	08/12/16 16:27	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA39SE001

Date Collected: 08/04/16 09:00

Date Received: 08/05/16 10:00

Lab Sample ID: 160-18504-1

Matrix: Solid

Tracer	%Yield	Qualifier	Limits
Pu-242 (T)	98.9		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/12/16 16:27	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Thorium-228	1.79		0.189	0.242	1.00	0.0953	pCi/g	08/09/16 10:28	08/15/16 17:21	1
Thorium-230	1.70		0.178	0.228	1.00	0.0140	pCi/g	08/09/16 10:28	08/15/16 17:21	1
Thorium-232	1.63		0.176	0.223	1.00	0.0514	pCi/g	08/09/16 10:28	08/15/16 17:21	1

Tracer	%Yield	Qualifier	Limits
Thorium-229	37.7		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:28	08/15/16 17:21	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Uranium-233/234	7.92		0.617	0.907	1.00	0.0898	pCi/g	08/09/16 10:32	08/15/16 17:30	1
Uranium-235/236	0.600		0.191	0.198	1.00	0.0921	pCi/g	08/09/16 10:32	08/15/16 17:30	1
Uranium-238	23.4		1.06	2.23	1.00	0.0358	pCi/g	08/09/16 10:32	08/15/16 17:30	1

Tracer	%Yield	Qualifier	Limits
Uranium-232	62.6		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/15/16 17:30	1

Method: H3-04-RC - Tritium (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Tritium	0.168	U	0.214	0.214	1.00	0.354	pCi/g	08/16/16 11:01	08/18/16 16:24	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Strontium 89/90	-0.00786	U	0.178	0.178	3.00	0.318	pCi/g	08/10/16 21:28	08/15/16 20:49	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	60.9		40 - 110					08/10/16 21:28	08/15/16 20:49	1

Method: TC-02-RC - Technetium-99 (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	(2σ+/-)						
Technetium-99	-0.231	U	0.265	0.266	1.00	0.509	pCi/g	08/11/16 16:14	08/16/16 13:54	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Tc-99m	93.2		30 - 110					08/11/16 16:14	08/16/16 13:54	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA40SE001

Lab Sample ID: 160-18504-2

Date Collected: 08/04/16 12:40

Matrix: Solid

Date Received: 08/05/16 10:00

Method: 8260C - Volatile Organic Compounds by GC/MS - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	0.0037	U	0.050	0.0037	mg/L			08/10/16 02:13	1
1,2-Dichloroethane	0.0037	U	0.050	0.0037	mg/L			08/10/16 02:13	1
2-Butanone (MEK)	0.0039	U	0.050	0.0039	mg/L			08/10/16 02:13	1
Benzene	0.0025	U	0.050	0.0025	mg/L			08/10/16 02:13	1
Carbon tetrachloride	0.0036	U	0.050	0.0036	mg/L			08/10/16 02:13	1
Chlorobenzene	0.0038	U	0.050	0.0038	mg/L			08/10/16 02:13	1
Chloroform	0.00092	U	0.050	0.00092	mg/L			08/10/16 02:13	1
Tetrachloroethylene	0.0028	U	0.050	0.0028	mg/L			08/10/16 02:13	1
Trichloroethylene	0.0029	U	0.050	0.0029	mg/L			08/10/16 02:13	1
Vinyl chloride	0.0043	U	0.10	0.0043	mg/L			08/10/16 02:13	1
Surrogate	%Recovery	Qualifier	Limits			D	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	99		84 - 120					08/10/16 02:13	1
1,2-Dichloroethane-d4 (Surr)	107		83 - 117					08/10/16 02:13	1
Toluene-d8 (Surr)	100		85 - 115					08/10/16 02:13	1
Dibromofluoromethane (Surr)	100		85 - 115					08/10/16 02:13	1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:02	1
2,4-Dinitrotoluene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:02	1
Hexachlorobenzene	0.0050	U N	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:02	1
Hexachlorobutadiene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:02	1
Hexachloroethane	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:02	1
2-Methylphenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 22:02	1
3 & 4 Methylphenol	0.0050	U	0.10	0.0050	mg/L		08/12/16 15:52	08/15/16 22:02	1
Nitrobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:02	1
Pentachlorophenol	0.010	U	0.25	0.010	mg/L		08/12/16 15:52	08/15/16 22:02	1
Pyridine	0.025	U	0.10	0.025	mg/L		08/12/16 15:52	08/15/16 22:02	1
2,4,5-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 22:02	1
2,4,6-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 22:02	1
Surrogate	%Recovery	Qualifier	Limits			D	Prepared	Analyzed	Dil Fac
2,4,6-Tribromophenol (Surr)	73		49 - 100				08/12/16 15:52	08/15/16 22:02	1
Nitrobenzene-d5 (Surr)	77		51 - 98				08/12/16 15:52	08/15/16 22:02	1
Phenol-d5 (Surr)	55		37 - 95				08/12/16 15:52	08/15/16 22:02	1
Terphenyl-d14 (Surr)	91		60 - 113				08/12/16 15:52	08/15/16 22:02	1
2-Fluorobiphenyl (Surr)	77		45 - 94				08/12/16 15:52	08/15/16 22:02	1
2-Fluorophenol (Surr)	60		46 - 92				08/12/16 15:52	08/15/16 22:02	1

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 15:43	1
PCB-1221	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 15:43	1
PCB-1232	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 15:43	1
PCB-1242	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 15:43	1
PCB-1248	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 15:43	1
PCB-1254	0.43		0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 15:43	1
PCB-1260	0.29		0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 15:43	1
PCB-1262	0.0080	U	0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 15:43	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA40SE001

Lab Sample ID: 160-18504-2

Matrix: Solid

Date Collected: 08/04/16 12:40

Date Received: 08/05/16 10:00

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Polychlorinated biphenyls, Total	0.73		0.033	0.0080	mg/Kg				1
PCB-1268	0.0080	U	0.033	0.0080	mg/Kg				1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>DCB Decachlorobiphenyl (Sur)</i>	127		23 - 146				08/15/16 11:07	08/19/16 15:43	1

Method: 8151A - Herbicides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.020	U	0.040	0.020	mg/L				1
Silvex (2,4,5-TP)	0.0030	U	0.010	0.0030	mg/L				1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>2,4-Dichlorophenylacetic acid</i>	118		56 - 147				08/12/16 16:02	08/18/16 17:27	1

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.010	U	0.025	0.010	mg/L				1
Barium	1.0		0.13	0.038	mg/L				1
Cadmium	0.0048	J	0.013	0.0038	mg/L				1
Chromium	0.0075	U	0.025	0.0075	mg/L				1
Lead	0.013	J	0.025	0.0075	mg/L				1
Selenium	0.013	U	0.038	0.013	mg/L				1
Silver	0.0075	U	0.025	0.0075	mg/L				1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0011		0.0010	0.000079	mg/L				1

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Americium-241	0.0294	U	0.0322	0.0324	1.00	0.0492	pCi/g	08/09/16 10:32	08/16/16 16:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Americium-243</i>	80.8		30 - 110					08/09/16 10:32	08/16/16 16:19	1

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Neptunium-237	0.0138	U	0.0286	0.0287	1.00	0.0560	pCi/g	08/09/16 10:28	08/12/16 16:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Neptunium-239</i>	100		30 - 110					08/09/16 10:28	08/12/16 16:30	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Plutonium-238	0.168		0.0754	0.0767	1.00	0.0585	pCi/g	08/09/16 10:32	08/12/16 16:27	1
Plutonium-239/240	0.0117	U	0.0228	0.0228	1.00	0.0437	pCi/g	08/09/16 10:32	08/12/16 16:27	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA40SE001

Lab Sample ID: 160-18504-2

Matrix: Solid

Date Collected: 08/04/16 12:40

Date Received: 08/05/16 10:00

Tracer	%Yield	Qualifier	Limits
Pu-242 (T)	90.7		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/12/16 16:27	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Thorium-228	1.93		0.282	0.325	1.00	0.108	pCi/g	08/09/16 10:28	08/12/16 16:24	1
Thorium-230	1.79		0.268	0.308	1.00	0.0560	pCi/g	08/09/16 10:28	08/12/16 16:24	1
Thorium-232	1.85		0.271	0.313	1.00	0.0481	pCi/g	08/09/16 10:28	08/12/16 16:24	1

Tracer	%Yield	Qualifier	Limits
Thorium-229	72.1		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:28	08/12/16 16:24	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-233/234	6.73		0.538	0.780	1.00	0.0717	pCi/g	08/09/16 10:32	08/15/16 17:30	1
Uranium-235/236	0.424		0.151	0.155	1.00	0.0646	pCi/g	08/09/16 10:32	08/15/16 17:30	1
Uranium-238	13.5		0.762	1.37	1.00	0.0518	pCi/g	08/09/16 10:32	08/15/16 17:30	1

Tracer	%Yield	Qualifier	Limits
Uranium-232	70.9		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/15/16 17:30	1

Method: H3-04-RC - Tritium (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Tritium	0.128	U	0.206	0.207	1.00	0.348	pCi/g	08/16/16 11:01	08/18/16 16:46	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium 89/90	0.0862	U	0.146	0.147	3.00	0.247	pCi/g	08/10/16 21:28	08/15/16 20:49	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	79.9		40 - 110					08/10/16 21:28	08/15/16 20:49	1

Method: TC-02-RC - Technetium-99 (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Technetium-99	0.161	U	0.236	0.236	1.00	0.394	pCi/g	08/11/16 16:14	08/16/16 14:15	1
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Tc-99m	90.7		30 - 110					08/11/16 16:14	08/16/16 14:15	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA41SE001

Lab Sample ID: 160-18504-3

Matrix: Solid

Date Collected: 08/04/16 13:25

Date Received: 08/05/16 10:00

Method: 8260C - Volatile Organic Compounds by GC/MS - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	0.0037	U	0.050	0.0037	mg/L			08/10/16 02:38	1
1,2-Dichloroethane	0.0037	U	0.050	0.0037	mg/L			08/10/16 02:38	1
2-Butanone (MEK)	0.0039	U	0.050	0.0039	mg/L			08/10/16 02:38	1
Benzene	0.0025	U	0.050	0.0025	mg/L			08/10/16 02:38	1
Carbon tetrachloride	0.0036	U	0.050	0.0036	mg/L			08/10/16 02:38	1
Chlorobenzene	0.0038	U	0.050	0.0038	mg/L			08/10/16 02:38	1
Chloroform	0.00092	U	0.050	0.00092	mg/L			08/10/16 02:38	1
Tetrachloroethylene	0.0028	U	0.050	0.0028	mg/L			08/10/16 02:38	1
Trichloroethylene	0.0029	U	0.050	0.0029	mg/L			08/10/16 02:38	1
Vinyl chloride	0.0043	U	0.10	0.0043	mg/L			08/10/16 02:38	1
Surrogate	%Recovery	Qualifier	Limits			D	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	98		84 - 120					08/10/16 02:38	1
1,2-Dichloroethane-d4 (Surr)	106		83 - 117					08/10/16 02:38	1
Toluene-d8 (Surr)	98		85 - 115					08/10/16 02:38	1
Dibromofluoromethane (Surr)	100		85 - 115					08/10/16 02:38	1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:35	1
2,4-Dinitrotoluene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:35	1
Hexachlorobenzene	0.0050	U N	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:35	1
Hexachlorobutadiene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:35	1
Hexachloroethane	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:35	1
2-Methylphenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 22:35	1
3 & 4 Methylphenol	0.0050	U	0.10	0.0050	mg/L		08/12/16 15:52	08/15/16 22:35	1
Nitrobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 22:35	1
Pentachlorophenol	0.010	U	0.25	0.010	mg/L		08/12/16 15:52	08/15/16 22:35	1
Pyridine	0.025	U	0.10	0.025	mg/L		08/12/16 15:52	08/15/16 22:35	1
2,4,5-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 22:35	1
2,4,6-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 22:35	1
Surrogate	%Recovery	Qualifier	Limits			D	Prepared	Analyzed	Dil Fac
2,4,6-Tribromophenol (Surr)	85		49 - 100				08/12/16 15:52	08/15/16 22:35	1
Nitrobenzene-d5 (Surr)	87		51 - 98				08/12/16 15:52	08/15/16 22:35	1
Phenol-d5 (Surr)	61		37 - 95				08/12/16 15:52	08/15/16 22:35	1
Terphenyl-d14 (Surr)	100		60 - 113				08/12/16 15:52	08/15/16 22:35	1
2-Fluorobiphenyl (Surr)	87		45 - 94				08/12/16 15:52	08/15/16 22:35	1
2-Fluorophenol (Surr)	68		46 - 92				08/12/16 15:52	08/15/16 22:35	1

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:05	1
PCB-1221	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:05	1
PCB-1232	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:05	1
PCB-1242	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:05	1
PCB-1248	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:05	1
PCB-1254	0.81		0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 16:05	1
PCB-1260	0.36		0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 16:05	1
PCB-1262	0.0080	U	0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 16:05	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA41SE001

Lab Sample ID: 160-18504-3

Matrix: Solid

Date Collected: 08/04/16 13:25

Date Received: 08/05/16 10:00

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Polychlorinated biphenyls, Total	1.2		0.033	0.0080	mg/Kg				1
PCB-1268	0.0080	U	0.033	0.0080	mg/Kg				1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>DCB Decachlorobiphenyl (Sur)</i>	104		23 - 146				08/15/16 11:07	08/19/16 16:05	1

Method: 8151A - Herbicides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.020	U	0.040	0.020	mg/L				1
Silvex (2,4,5-TP)	0.0030	U	0.010	0.0030	mg/L				1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>2,4-Dichlorophenylacetic acid</i>	95		56 - 147				08/12/16 16:02	08/18/16 17:59	1

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.010	U	0.025	0.010	mg/L				1
Barium	1.2		0.13	0.038	mg/L				1
Cadmium	0.026		0.013	0.0038	mg/L				1
Chromium	0.0098	J	0.025	0.0075	mg/L				1
Lead	0.24		0.025	0.0075	mg/L				1
Selenium	0.013	U	0.038	0.013	mg/L				1
Silver	0.0075	U	0.025	0.0075	mg/L				1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0024		0.0010	0.000079	mg/L				1

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Americium-241	0.298		0.0907	0.0965	1.00	0.0589	pCi/g	08/09/16 10:32	08/16/16 16:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Americium-243</i>	67.9		30 - 110					08/09/16 10:32	08/16/16 16:19	1

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Neptunium-237	0.0643		0.0489	0.0492	1.00	0.0537	pCi/g	08/09/16 10:28	08/12/16 16:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Neptunium-239</i>	99.3		30 - 110					08/09/16 10:28	08/12/16 16:30	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Plutonium-238	0.373		0.111	0.115	1.00	0.0638	pCi/g	08/09/16 10:32	08/12/16 16:27	1
Plutonium-239/240	0.0448		0.0383	0.0385	1.00	0.0377	pCi/g	08/09/16 10:32	08/12/16 16:27	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA41SE001

Lab Sample ID: 160-18504-3

Matrix: Solid

Date Collected: 08/04/16 13:25

Date Received: 08/05/16 10:00

Tracer	%Yield	Qualifier	Limits
Pu-242 (T)	91.4		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/12/16 16:27	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Thorium-228	5.71		0.589	0.760	1.00	0.145	pCi/g	08/09/16 10:28	08/12/16 16:24	1
Thorium-230	3.60		0.466	0.555	1.00	0.0727	pCi/g	08/09/16 10:28	08/12/16 16:24	1
Thorium-232	5.93		0.596	0.777	1.00	0.0924	pCi/g	08/09/16 10:28	08/12/16 16:24	1

Tracer	%Yield	Qualifier	Limits
Thorium-229	50.6		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:28	08/12/16 16:24	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-233/234	17.1		0.986	1.74	1.00	0.0878	pCi/g	08/09/16 10:32	08/15/16 17:30	1
Uranium-235/236	1.34		0.308	0.328	1.00	0.0530	pCi/g	08/09/16 10:32	08/15/16 17:30	1
Uranium-238	30.1		1.31	2.84	1.00	0.0686	pCi/g	08/09/16 10:32	08/15/16 17:30	1

Tracer	%Yield	Qualifier	Limits
Uranium-232	54.2		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/15/16 17:30	1

Method: H3-04-RC - Tritium (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Tritium	0.104	U	0.221	0.221	1.00	0.380	pCi/g	08/16/16 11:01	08/18/16 17:09	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium 89/90	0.270	U	0.263	0.264	3.00	0.426	pCi/g	08/15/16 21:31	08/17/16 11:57	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	89.0		40 - 110					08/15/16 21:31	08/17/16 11:57	1

Method: TC-02-RC - Technetium-99 (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Technetium-99	0.261	U	0.226	0.228	1.00	0.367	pCi/g	08/11/16 16:14	08/16/16 14:36	1
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Tc-99m	87.4		30 - 110					08/11/16 16:14	08/16/16 14:36	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA73SE001

Lab Sample ID: 160-18504-4

Date Collected: 08/04/16 14:00

Matrix: Solid

Date Received: 08/05/16 10:00

Method: 8260C - Volatile Organic Compounds by GC/MS - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	0.0037	U	0.050	0.0037	mg/L			08/10/16 03:03	1
1,2-Dichloroethane	0.0037	U	0.050	0.0037	mg/L			08/10/16 03:03	1
2-Butanone (MEK)	0.0039	U	0.050	0.0039	mg/L			08/10/16 03:03	1
Benzene	0.0025	U	0.050	0.0025	mg/L			08/10/16 03:03	1
Carbon tetrachloride	0.0036	U	0.050	0.0036	mg/L			08/10/16 03:03	1
Chlorobenzene	0.0038	U	0.050	0.0038	mg/L			08/10/16 03:03	1
Chloroform	0.00092	U	0.050	0.00092	mg/L			08/10/16 03:03	1
Tetrachloroethylene	0.0028	U	0.050	0.0028	mg/L			08/10/16 03:03	1
Trichloroethylene	0.0029	U	0.050	0.0029	mg/L			08/10/16 03:03	1
Vinyl chloride	0.0043	U	0.10	0.0043	mg/L			08/10/16 03:03	1
Surrogate		%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97			84 - 120				08/10/16 03:03	1
1,2-Dichloroethane-d4 (Surr)	107			83 - 117				08/10/16 03:03	1
Toluene-d8 (Surr)	99			85 - 115				08/10/16 03:03	1
Dibromofluoromethane (Surr)	99			85 - 115				08/10/16 03:03	1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 23:08	1
2,4-Dinitrotoluene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 23:08	1
Hexachlorobenzene	0.0050	U N	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 23:08	1
Hexachlorobutadiene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 23:08	1
Hexachloroethane	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 23:08	1
2-Methylphenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 23:08	1
3 & 4 Methylphenol	0.0050	U	0.10	0.0050	mg/L		08/12/16 15:52	08/15/16 23:08	1
Nitrobenzene	0.0050	U	0.050	0.0050	mg/L		08/12/16 15:52	08/15/16 23:08	1
Pentachlorophenol	0.010	U	0.25	0.010	mg/L		08/12/16 15:52	08/15/16 23:08	1
Pyridine	0.025	U	0.10	0.025	mg/L		08/12/16 15:52	08/15/16 23:08	1
2,4,5-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 23:08	1
2,4,6-Trichlorophenol	0.010	U	0.050	0.010	mg/L		08/12/16 15:52	08/15/16 23:08	1
Surrogate		%Recovery	Qualifier	Limits			Prepared	Analyzed	Dil Fac
2,4,6-Tribromophenol (Surr)	73			49 - 100				08/12/16 15:52	08/15/16 23:08
Nitrobenzene-d5 (Surr)	75			51 - 98				08/12/16 15:52	08/15/16 23:08
Phenol-d5 (Surr)	53			37 - 95				08/12/16 15:52	08/15/16 23:08
Terphenyl-d14 (Surr)	98			60 - 113				08/12/16 15:52	08/15/16 23:08
2-Fluorobiphenyl (Surr)	76			45 - 94				08/12/16 15:52	08/15/16 23:08
2-Fluorophenol (Surr)	59			46 - 92				08/12/16 15:52	08/15/16 23:08

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
PCB-1016	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:28	1
PCB-1221	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:28	1
PCB-1232	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:28	1
PCB-1242	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:28	1
PCB-1248	0.0096	U	0.033	0.0096	mg/Kg		08/15/16 11:07	08/19/16 16:28	1
PCB-1254	0.66		0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 16:28	1
PCB-1260	0.32		0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 16:28	1
PCB-1262	0.0080	U	0.033	0.0080	mg/Kg		08/15/16 11:07	08/19/16 16:28	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA73SE001

Lab Sample ID: 160-18504-4

Matrix: Solid

Date Collected: 08/04/16 14:00

Date Received: 08/05/16 10:00

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Polychlorinated biphenyls, Total	0.99		0.033	0.0080	mg/Kg				1
PCB-1268	0.0080	U	0.033	0.0080	mg/Kg				1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>DCB Decachlorobiphenyl (Sur)</i>	73		23 - 146				08/15/16 11:07	08/19/16 16:28	1

Method: 8151A - Herbicides (GC) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.020	U	0.040	0.020	mg/L		08/12/16 16:02	08/18/16 18:28	1
Silvex (2,4,5-TP)	0.0030	U	0.010	0.0030	mg/L		08/12/16 16:02	08/18/16 18:28	1
Surrogate	%Recovery	Qualifier	Limits				Prepared	Analyzed	Dil Fac
<i>2,4-Dichlorophenylacetic acid</i>	112		56 - 147				08/12/16 16:02	08/18/16 18:28	1

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.010	U	0.025	0.010	mg/L		08/15/16 15:12	08/16/16 17:14	1
Barium	0.93		0.13	0.038	mg/L		08/15/16 15:12	08/16/16 17:14	1
Cadmium	0.010	J	0.013	0.0038	mg/L		08/15/16 15:12	08/16/16 17:14	1
Chromium	0.0075	U	0.025	0.0075	mg/L		08/15/16 15:12	08/16/16 17:14	1
Lead	0.0075	U	0.025	0.0075	mg/L		08/15/16 15:12	08/16/16 17:14	1
Selenium	0.013	U	0.038	0.013	mg/L		08/15/16 15:12	08/16/16 17:14	1
Silver	0.0075	U	0.025	0.0075	mg/L		08/15/16 15:12	08/16/16 17:14	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.0016		0.0010	0.000079	mg/L		08/16/16 11:23	08/17/16 10:20	1

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Americium-241	0.192		0.0760	0.0789	1.00	0.0658	pCi/g	08/09/16 10:32	08/16/16 16:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Americium-243</i>	75.1		30 - 110					08/09/16 10:32	08/16/16 16:19	1

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Neptunium-237	-0.0101	U	0.00905	0.00909	1.00	0.0576	pCi/g	08/09/16 10:28	08/12/16 16:30	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
<i>Neptunium-239</i>	94.3		30 - 110					08/09/16 10:28	08/12/16 16:30	1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Plutonium-238	0.770		0.156	0.169	1.00	0.0631	pCi/g	08/09/16 10:32	08/12/16 16:27	1
Plutonium-239/240	0.0616		0.0436	0.0439	1.00	0.0231	pCi/g	08/09/16 10:32	08/12/16 16:27	1

TestAmerica St. Louis

Client Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Client Sample ID: YMTFA73SE001

Lab Sample ID: 160-18504-4

Matrix: Solid

Date Collected: 08/04/16 14:00

Date Received: 08/05/16 10:00

Tracer	%Yield	Qualifier	Limits
Pu-242 (T)	103		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/12/16 16:27	1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Thorium-228	1.01		0.181	0.200	1.00	0.145	pCi/g	08/09/16 10:28	08/15/16 17:21	1
Thorium-230	0.772		0.145	0.159	1.00	0.0514	pCi/g	08/09/16 10:28	08/15/16 17:21	1
Thorium-232	0.972		0.163	0.183	1.00	0.0640	pCi/g	08/09/16 10:28	08/15/16 17:21	1

Tracer	%Yield	Qualifier	Limits
Thorium-229	28.7	S	30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:28	08/15/16 17:21	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-233/234	9.65		0.359	0.887	1.00	0.0447	pCi/g	08/09/16 10:32	08/16/16 16:13	1
Uranium-235/236	0.887		0.122	0.143	1.00	0.0317	pCi/g	08/09/16 10:32	08/16/16 16:13	1
Uranium-238	27.4		0.604	2.38	1.00	0.00998	pCi/g	08/09/16 10:32	08/16/16 16:13	1

Tracer	%Yield	Qualifier	Limits
Uranium-232	58.0		30 - 110

Prepared	Analyzed	Dil Fac
08/09/16 10:32	08/16/16 16:13	1

Method: H3-04-RC - Tritium (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Tritium	0.0547	U	0.202	0.202	1.00	0.355	pCi/g	08/16/16 11:01	08/18/16 17:32	1

Method: SR-03-RC - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium 89/90	0.0138	U	0.136	0.136	3.00	0.243	pCi/g	08/10/16 21:28	08/15/16 20:49	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Sr Carrier</i>	<i>70.0</i>		<i>40 - 110</i>					<i>08/10/16 21:28</i>	<i>08/15/16 20:49</i>	<i>1</i>

Method: TC-02-RC - Technetium-99 (LSC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Technetium-99	0.0987	U	0.228	0.228	1.00	0.390	pCi/g	08/11/16 16:14	08/16/16 15:18	1
<i>Tracer</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Tc-99m</i>	<i>90.4</i>		<i>30 - 110</i>					<i>08/11/16 16:14</i>	<i>08/16/16 15:18</i>	<i>1</i>

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: LCS 160-264101/12

Matrix: Solid

Analysis Batch: 264101

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
							Limits
1,1-Dichloroethene	0.500	0.487		mg/L		97	79 - 117
1,2-Dichloroethane	0.500	0.498		mg/L		100	80 - 115
2-Butanone (MEK)	0.500	0.495		mg/L		99	64 - 117
Benzene	0.500	0.482		mg/L		96	85 - 115
Carbon tetrachloride	0.500	0.494		mg/L		99	79 - 119
Chlorobenzene	0.500	0.496		mg/L		99	85 - 115
Chloroform	0.500	0.482		mg/L		96	85 - 115
Tetrachloroethylene	0.500	0.495		mg/L		99	79 - 116
Trichloroethylene	0.500	0.486		mg/L		97	85 - 115
Vinyl chloride	0.500	0.550		mg/L		110	72 - 136

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	97		84 - 120
1,2-Dichloroethane-d4 (Surr)	102		83 - 117
Toluene-d8 (Surr)	99		85 - 115
Dibromofluoromethane (Surr)	100		85 - 115

Lab Sample ID: LB 160-263916/1-A

Matrix: Solid

Analysis Batch: 264101

Client Sample ID: Method Blank
Prep Type: TCLP

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethene	0.0037	U	0.050	0.0037	mg/L		08/10/16 00:32		1
1,2-Dichloroethane	0.0037	U	0.050	0.0037	mg/L		08/10/16 00:32		1
2-Butanone (MEK)	0.0039	U	0.050	0.0039	mg/L		08/10/16 00:32		1
Benzene	0.0025	U	0.050	0.0025	mg/L		08/10/16 00:32		1
Carbon tetrachloride	0.0036	U	0.050	0.0036	mg/L		08/10/16 00:32		1
Chlorobenzene	0.0038	U	0.050	0.0038	mg/L		08/10/16 00:32		1
Chloroform	0.00092	U	0.050	0.00092	mg/L		08/10/16 00:32		1
Tetrachloroethylene	0.0028	U	0.050	0.0028	mg/L		08/10/16 00:32		1
Trichloroethylene	0.0029	U	0.050	0.0029	mg/L		08/10/16 00:32		1
Vinyl chloride	0.0043	U	0.10	0.0043	mg/L		08/10/16 00:32		1

Surrogate	LB %Recovery	LBS Qualifier	Limits
4-Bromofluorobenzene (Surr)	97		84 - 120
1,2-Dichloroethane-d4 (Surr)	102		83 - 117
Toluene-d8 (Surr)	97		85 - 115
Dibromofluoromethane (Surr)	100		85 - 115

Lab Sample ID: 160-18420-C-2-A MS

Matrix: Solid

Analysis Batch: 264101

Client Sample ID: Matrix Spike
Prep Type: TCLP

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec.
									Limits
1,1-Dichloroethene	0.0037	U	0.500	0.500		mg/L		100	80 - 115
1,2-Dichloroethane	0.0037	U	0.500	0.502		mg/L		100	85 - 115
2-Butanone (MEK)	0.0039	U	0.500	0.501		mg/L		100	67 - 117

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: 160-18420-C-2-A MS

Matrix: Solid

Analysis Batch: 264101

Client Sample ID: Matrix Spike
Prep Type: TCLP

Analyte	Sample	Sample	Spike	MS	MS	Unit	D	%Rec	%Limits		
	Result	Qualifier	Added	Result	Qualifier						
Benzene	0.0025	U	0.500	0.500		mg/L	100	85 - 115			
Carbon tetrachloride	0.0036	U	0.500	0.511		mg/L	102	79 - 117			
Chlorobenzene	0.0038	U	0.500	0.502		mg/L	100	85 - 115			
Chloroform	0.00092	U	0.500	0.502		mg/L	100	85 - 115			
Tetrachloroethene	0.0028	U	0.500	0.507		mg/L	101	82 - 115			
Trichloroethene	0.0029	U	0.500	0.511		mg/L	102	84 - 115			
Vinyl chloride	0.0043	U	0.500	0.551		mg/L	110	75 - 132			

Surrogate	MS	MS	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	100		84 - 120
1,2-Dichloroethane-d4 (Surr)	105		83 - 117
Toluene-d8 (Surr)	102		85 - 115
Dibromofluoromethane (Surr)	103		85 - 115

Lab Sample ID: 160-18420-C-2-A MSD

Matrix: Solid

Analysis Batch: 264101

Client Sample ID: Matrix Spike Duplicate
Prep Type: TCLP

Analyte	Sample	Sample	Spike	MSD	MSD	Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier	Added	Result	Qualifier						
1,1-Dichloroethene	0.0037	U	0.500	0.488		mg/L	98	80 - 115		2	20
1,2-Dichloroethane	0.0037	U	0.500	0.500		mg/L	100	85 - 115		0	20
2-Butanone (MEK)	0.0039	U	0.500	0.523		mg/L	105	67 - 117		4	20
Benzene	0.0025	U	0.500	0.489		mg/L	98	85 - 115		2	20
Carbon tetrachloride	0.0036	U	0.500	0.495		mg/L	99	79 - 117		3	20
Chlorobenzene	0.0038	U	0.500	0.502		mg/L	100	85 - 115		0	20
Chloroform	0.00092	U	0.500	0.488		mg/L	98	85 - 115		3	20
Tetrachloroethene	0.0028	U	0.500	0.498		mg/L	100	82 - 115		2	20
Trichloroethene	0.0029	U	0.500	0.496		mg/L	99	84 - 115		3	20
Vinyl chloride	0.0043	U	0.500	0.542		mg/L	108	75 - 132		2	20

Surrogate	MSD	MSD	Limits
	%Recovery	Qualifier	
4-Bromofluorobenzene (Surr)	98		84 - 120
1,2-Dichloroethane-d4 (Surr)	102		83 - 117
Toluene-d8 (Surr)	100		85 - 115
Dibromofluoromethane (Surr)	101		85 - 115

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Lab Sample ID: LCS 160-264673/2-A

Matrix: Solid

Analysis Batch: 264877

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 264673

Analyte	Spike	LCS	LCS	Unit	D	%Rec	%Limits
	Added	Result	Qualifier				
1,4-Dichlorobenzene	0.500	0.385		mg/L	77	36 - 93	
2,4-Dinitrotoluene	0.500	0.415		mg/L	83	51 - 90	
Hexachlorobenzene	0.500	0.509	N	mg/L	102	52 - 93	
Hexachlorobutadiene	0.500	0.388		mg/L	78	37 - 92	

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 160-264673/2-A

Matrix: Solid

Analysis Batch: 264877

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264673

%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Hexachloroethane	0.500	0.379		mg/L	76	36 - 95	
2-Methylphenol	0.500	0.401		mg/L	80	51 - 100	
3 & 4 Methylphenol	0.500	0.361		mg/L	72	46 - 95	
Nitrobenzene	0.500	0.404		mg/L	81	51 - 93	
Pentachlorophenol	0.500	0.428		mg/L	86	41 - 96	
Pyridine	0.500	0.275		mg/L	55	10 - 80	
2,4,5-Trichlorophenol	0.500	0.441		mg/L	88	49 - 96	
2,4,6-Trichlorophenol	0.500	0.457		mg/L	91	48 - 93	

Surrogate	LCS %Recovery	LCS Qualifier	Limits
2,4,6-Tribromophenol (Surr)	92		49 - 100
Nitrobenzene-d5 (Surr)	84		51 - 98
Phenol-d5 (Surr)	78		37 - 95
Terphenyl-d14 (Surr)	104		60 - 113
2-Fluorobiphenyl (Surr)	87		45 - 94
2-Fluorophenol (Surr)	79		46 - 92

Lab Sample ID: LB 160-264502/1-B

Matrix: Solid

Analysis Batch: 264877

Client Sample ID: Method Blank

Prep Type: TCLP

Prep Batch: 264673

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,4-Dichlorobenzene	0.0050	U	0.050	0.0050	mg/L	08/12/16 15:52	08/15/16 17:03		1
2,4-Dinitrotoluene	0.0050	U	0.050	0.0050	mg/L	08/12/16 15:52	08/15/16 17:03		1
Hexachlorobenzene	0.0050	U	0.050	0.0050	mg/L	08/12/16 15:52	08/15/16 17:03		1
Hexachlorobutadiene	0.0050	U	0.050	0.0050	mg/L	08/12/16 15:52	08/15/16 17:03		1
Hexachloroethane	0.0050	U	0.050	0.0050	mg/L	08/12/16 15:52	08/15/16 17:03		1
2-Methylphenol	0.010	U	0.050	0.010	mg/L	08/12/16 15:52	08/15/16 17:03		1
3 & 4 Methylphenol	0.0050	U	0.10	0.0050	mg/L	08/12/16 15:52	08/15/16 17:03		1
Nitrobenzene	0.0050	U	0.050	0.0050	mg/L	08/12/16 15:52	08/15/16 17:03		1
Pentachlorophenol	0.010	U S	0.25	0.010	mg/L	08/12/16 15:52	08/15/16 17:03		1
Pyridine	0.025	U	0.10	0.025	mg/L	08/12/16 15:52	08/15/16 17:03		1
2,4,5-Trichlorophenol	0.010	U S	0.050	0.010	mg/L	08/12/16 15:52	08/15/16 17:03		1
2,4,6-Trichlorophenol	0.010	U S	0.050	0.010	mg/L	08/12/16 15:52	08/15/16 17:03		1

Surrogate	LB %Recovery	LB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4,6-Tribromophenol (Surr)	101	S	49 - 100	08/12/16 15:52	08/15/16 17:03	1
Nitrobenzene-d5 (Surr)	93		51 - 98	08/12/16 15:52	08/15/16 17:03	1
Phenol-d5 (Surr)	82		37 - 95	08/12/16 15:52	08/15/16 17:03	1
Terphenyl-d14 (Surr)	112		60 - 113	08/12/16 15:52	08/15/16 17:03	1
2-Fluorobiphenyl (Surr)	92		45 - 94	08/12/16 15:52	08/15/16 17:03	1
2-Fluorophenol (Surr)	84		46 - 92	08/12/16 15:52	08/15/16 17:03	1

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: 160-18420-B-1-G MS

Matrix: Solid

Analysis Batch: 264877

Client Sample ID: Matrix Spike

Prep Type: TCLP

Prep Batch: 264673

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec.	Limits
1,4-Dichlorobenzene	0.0050	U	0.500	0.356		mg/L	71	46 - 88		
2,4-Dinitrotoluene	0.0050	U S	0.500	0.390		mg/L	78	52 - 97		
Hexachlorobenzene	0.0050	U S N	0.500	0.489	N	mg/L	98	56 - 90		
Hexachlorobutadiene	0.0050	U	0.500	0.348		mg/L	70	43 - 92		
Hexachloroethane	0.0050	U	0.500	0.342		mg/L	68	44 - 91		
2-Methylphenol	0.010	U	0.500	0.377		mg/L	75	55 - 97		
3 & 4 Methylphenol	0.0050	U	0.500	0.337		mg/L	67	46 - 94		
Nitrobenzene	0.0050	U	0.500	0.387		mg/L	77	53 - 97		
Pentachlorophenol	0.010	U	0.500	0.408		mg/L	82	39 - 103		
Pyridine	0.025	U	0.500	0.278		mg/L	56	10 - 82		
2,4,5-Trichlorophenol	0.010	U	0.500	0.412		mg/L	82	52 - 98		
2,4,6-Trichlorophenol	0.010	U	0.500	0.421		mg/L	84	52 - 94		
Surrogate		MS Recovery	MS Qualifier	Limits						
2,4,6-Tribromophenol (Surr)	84			49 - 100						
Nitrobenzene-d5 (Surr)	79			51 - 98						
Phenol-d5 (Surr)	70			37 - 95						
Terphenyl-d14 (Surr)	102			60 - 113						
2-Fluorobiphenyl (Surr)	80			45 - 94						
2-Fluorophenol (Surr)	67			46 - 92						

Lab Sample ID: 160-18420-B-1-H MSD

Matrix: Solid

Analysis Batch: 264877

Client Sample ID: Matrix Spike Duplicate

Prep Type: TCLP

Prep Batch: 264673

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec.	RPD	RPD Limit
1,4-Dichlorobenzene	0.0050	U	0.500	0.345		mg/L	69	46 - 88		3	20
2,4-Dinitrotoluene	0.0050	U S	0.500	0.367		mg/L	73	52 - 97		6	20
Hexachlorobenzene	0.0050	U S N	0.500	0.450		mg/L	90	56 - 90		8	20
Hexachlorobutadiene	0.0050	U	0.500	0.347		mg/L	69	43 - 92		0	20
Hexachloroethane	0.0050	U	0.500	0.335		mg/L	67	44 - 91		2	20
2-Methylphenol	0.010	U	0.500	0.376		mg/L	75	55 - 97		0	20
3 & 4 Methylphenol	0.0050	U	0.500	0.337		mg/L	67	46 - 94		0	20
Nitrobenzene	0.0050	U	0.500	0.375		mg/L	75	53 - 97		3	20
Pentachlorophenol	0.010	U	0.500	0.353		mg/L	71	39 - 103		14	20
Pyridine	0.025	U	0.500	0.286		mg/L	57	10 - 82		3	20
2,4,5-Trichlorophenol	0.010	U	0.500	0.397		mg/L	79	52 - 98		4	20
2,4,6-Trichlorophenol	0.010	U	0.500	0.413		mg/L	83	52 - 94		2	20
Surrogate		MSD Recovery	MSD Qualifier	Limits							
2,4,6-Tribromophenol (Surr)	76			49 - 100							
Nitrobenzene-d5 (Surr)	76			51 - 98							
Phenol-d5 (Surr)	68			37 - 95							
Terphenyl-d14 (Surr)	98			60 - 113							
2-Fluorobiphenyl (Surr)	80			45 - 94							
2-Fluorophenol (Surr)	64			46 - 92							

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Lab Sample ID: MB 160-264775/1-A

Matrix: Solid

Analysis Batch: 265137

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264775

Analyte	MB		RL	MDL	Unit	D	Prepared		Analyzed	Dil Fac
	Result	Qualifier					Prepared	Analyzed		
PCB-1016	0.0096	U	0.033	0.0096	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1221	0.0096	U	0.033	0.0096	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1232	0.0096	U	0.033	0.0096	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1242	0.0096	U	0.033	0.0096	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1248	0.0096	U	0.033	0.0096	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1254	0.0080	U	0.033	0.0080	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1260	0.0080	U	0.033	0.0080	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1262	0.0080	U	0.033	0.0080	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
Polychlorinated biphenyls, Total	0.0080	U	0.033	0.0080	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	
PCB-1268	0.0080	U	0.033	0.0080	mg/Kg	08/15/16 11:07	08/17/16 11:06		1	

MB MB

Surrogate	MB		Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier				
DCB Decachlorobiphenyl (Surrogate)	101		23 - 146	08/15/16 11:07	08/17/16 11:06	1

Lab Sample ID: LCS 160-264775/2-A

Matrix: Solid

Analysis Batch: 265137

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264775

Analyte	Spike		LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
	Added	Result						
PCB-1016		0.167	0.153		mg/Kg		92	52 - 134
PCB-1260		0.167	0.158		mg/Kg		95	50 - 132

Surrogate	LCS		LCS	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier					
DCB Decachlorobiphenyl (Surrogate)	106			23 - 146	08/15/16 11:07	08/17/16 11:06	1

Lab Sample ID: 160-18504-1 MS

Matrix: Solid

Analysis Batch: 265549

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264775

Analyte	Sample		Spike	MS		D	%Rec	%Rec.
	Result	Qualifier		Result	Qualifier			
PCB-1016	0.0095	U	0.167	0.156	J	mg/Kg	93	23 - 140
PCB-1260	0.17		0.167	0.234		mg/Kg	36	20 - 131

Surrogate	MS		MS	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier					
DCB Decachlorobiphenyl (Surrogate)	76	J		23 - 146	08/15/16 11:07	08/17/16 11:06	1

Lab Sample ID: 160-18504-1 MSD

Matrix: Solid

Analysis Batch: 265549

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264775

Analyte	Sample		Spike	MSD		D	%Rec	%Rec.
	Result	Qualifier		Result	Qualifier			
PCB-1016	0.0095	U	0.166	0.168	J	mg/Kg	101	23 - 140
PCB-1260	0.17		0.166	0.250		mg/Kg	45	20 - 131

Surrogate	MSD		MSD	Limits	Prepared	Analyzed	Dil Fac
	%Recovery	Qualifier					
DCB Decachlorobiphenyl (Surrogate)	101			23 - 146	08/15/16 11:07	08/17/16 11:06	1

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8151A - Herbicides (GC)

Lab Sample ID: LCS 160-264676/2-A

Matrix: Solid

Analysis Batch: 265408

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264676

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
2,4-D	0.200	0.237		mg/L		119	46 - 140
Silvex (2,4,5-TP)	0.0500	0.0641		mg/L		128	42 - 140
Surrogate	%Recovery	LCS Qualifier	Limits				Limits
2,4-Dichlorophenylacetic acid	115		56 - 147				

Lab Sample ID: LB 160-264502/1-C

Matrix: Solid

Analysis Batch: 265408

Client Sample ID: Method Blank

Prep Type: TCLP

Prep Batch: 264676

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-D	0.020	U	0.040	0.020	mg/L		08/12/16 16:02	08/18/16 14:40	1
Silvex (2,4,5-TP)	0.0030	U	0.010	0.0030	mg/L		08/12/16 16:02	08/18/16 14:40	1
Surrogate	%Recovery	LB Qualifier	Limits				Prepared	Analyzed	Dil Fac
2,4-Dichlorophenylacetic acid	78		56 - 147				08/12/16 16:02	08/18/16 14:40	1

Lab Sample ID: 160-18504-1 MS

Matrix: Solid

Analysis Batch: 265408

Client Sample ID: YMTFA39SE001

Prep Type: TCLP

Prep Batch: 264676

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec.
2,4-D	0.020	U	0.200	0.171		mg/L		86	52 - 150
Silvex (2,4,5-TP)	0.0030	U	0.0500	0.0459		mg/L		92	45 - 150
Surrogate	%Recovery	MS Qualifier	Limits						Limits
2,4-Dichlorophenylacetic acid	94		56 - 147						

Lab Sample ID: 160-18504-1 MSD

Matrix: Solid

Analysis Batch: 265408

Client Sample ID: YMTFA39SE001

Prep Type: TCLP

Prep Batch: 264676

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec.	RPD	
2,4-D	0.020	U	0.200	0.188		mg/L		94	52 - 150	9	20
Silvex (2,4,5-TP)	0.0030	U	0.0500	0.0514		mg/L		103	45 - 150	11	20
Surrogate	%Recovery	MSD Qualifier	Limits							RPD	Limit
2,4-Dichlorophenylacetic acid	107		56 - 147								

Method: 6010C - Metals (ICP)

Lab Sample ID: LCS 160-264871/2-A

Matrix: Solid

Analysis Batch: 265144

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264871

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec.
Arsenic	2.50	2.55		mg/L		102	80 - 120

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 160-264871/2-A

Matrix: Solid

Analysis Batch: 265144

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264871

%Rec.

Analyte	Spike Added	LCS		Unit	D	%Rec	Limits
		Result	Qualifier				
Barium	2.50	2.53		mg/L	101	80 - 120	
Cadmium	2.50	2.55		mg/L	102	80 - 120	
Chromium	2.50	2.56		mg/L	102	80 - 120	
Lead	2.50	2.47		mg/L	99	80 - 120	
Selenium	1.25	1.31		mg/L	105	80 - 120	
Silver	0.500	0.588		mg/L	118	80 - 120	

Lab Sample ID: LB 160-263996/1-B

Matrix: Solid

Analysis Batch: 265144

Client Sample ID: Method Blank

Prep Type: TCLP

Prep Batch: 264871

Analyte	LB		RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
	Result	Qualifier							
Arsenic	0.010	U	0.025	0.010	mg/L	08/15/16 15:12	08/16/16 16:23		1
Barium	0.038	U	0.13	0.038	mg/L	08/15/16 15:12	08/16/16 16:23		1
Cadmium	0.0038	U	0.013	0.0038	mg/L	08/15/16 15:12	08/16/16 16:23		1
Chromium	0.0075	U	0.025	0.0075	mg/L	08/15/16 15:12	08/16/16 16:23		1
Lead	0.0075	U	0.025	0.0075	mg/L	08/15/16 15:12	08/16/16 16:23		1
Selenium	0.013	U	0.038	0.013	mg/L	08/15/16 15:12	08/16/16 16:23		1
Silver	0.0075	U	0.025	0.0075	mg/L	08/15/16 15:12	08/16/16 16:23		1

Lab Sample ID: 160-18504-1 MS

Matrix: Solid

Analysis Batch: 265144

Client Sample ID: YMTFA39SE001

Prep Type: TCLP

Prep Batch: 264871

%Rec.

Analyte	Sample		Spike Added	MS		Unit	D	%Rec	Limits
	Result	Qualifier		Result	Qualifier				
Arsenic	0.010	U	2.50	2.59		mg/L	104	75 - 125	
Barium	0.95		2.50	3.42		mg/L	99	75 - 125	
Cadmium	0.0060	J	2.50	2.61		mg/L	104	75 - 125	
Chromium	0.0075	U	2.50	2.56		mg/L	102	75 - 125	
Lead	0.0075	U	2.50	2.46		mg/L	98	75 - 125	
Selenium	0.013	U	1.25	1.32		mg/L	106	75 - 125	
Silver	0.0075	U	0.500	0.594		mg/L	119	75 - 125	

Lab Sample ID: 160-18504-1 MSD

Matrix: Solid

Analysis Batch: 265144

Client Sample ID: YMTFA39SE001

Prep Type: TCLP

Prep Batch: 264871

%Rec.

Analyte	Sample		Spike Added	MSD		Unit	D	%Rec	Limits	RPD	Limit
	Result	Qualifier		Result	Qualifier						
Arsenic	0.010	U	2.50	2.57		mg/L	103	75 - 125		1	20
Barium	0.95		2.50	3.43		mg/L	99	75 - 125		0	20
Cadmium	0.0060	J	2.50	2.59		mg/L	103	75 - 125		1	20
Chromium	0.0075	U	2.50	2.54		mg/L	102	75 - 125		1	20
Lead	0.0075	U	2.50	2.43		mg/L	97	75 - 125		1	20
Selenium	0.013	U	1.25	1.32		mg/L	105	75 - 125		0	20
Silver	0.0075	U	0.500	0.591		mg/L	118	75 - 125		1	20

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 7470A - Mercury (CVAA)

Lab Sample ID: LCS 160-265037/2-A

Matrix: Solid

Analysis Batch: 265178

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 265037

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec.	Limits
Mercury	0.0250	0.0253		mg/L	101	80 - 120	

Lab Sample ID: LB 160-263996/1-C

Matrix: Solid

Analysis Batch: 265178

Client Sample ID: Method Blank

Prep Type: TCLP

Prep Batch: 265037

Analyte	LB Result	LB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	0.000079	U	0.0010	0.000079	mg/L	08/16/16 11:23	08/17/16 09:32		1

Lab Sample ID: 160-18504-1 MS

Matrix: Solid

Analysis Batch: 265178

Client Sample ID: YMTFA39SE001

Prep Type: TCLP

Prep Batch: 265037

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec.	Limits
Mercury	0.0042		0.0250	0.0268		mg/L	90	70 - 130	

Lab Sample ID: 160-18504-1 MSD

Matrix: Solid

Analysis Batch: 265178

Client Sample ID: YMTFA39SE001

Prep Type: TCLP

Prep Batch: 265037

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec.	RPD	RPD Limit
Mercury	0.0042		0.0250	0.0261		mg/L	88	70 - 130	3	20

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-264058/1-A

Matrix: Solid

Analysis Batch: 264793

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264058

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)		RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier		Result	Qualifier						
Thorium-228	0.02579	U	0.0495	0.0495	1.00	0.0910	pCi/g	08/09/16 10:28	08/12/16 16:24		1
Thorium-230	0.1384		0.0704	0.0714	1.00	0.0425	pCi/g	08/09/16 10:28	08/12/16 16:24		1
Thorium-232	0.004372	U	0.0185	0.0186	1.00	0.0490	pCi/g	08/09/16 10:28	08/12/16 16:24		1

Tracer	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Thorium-229	87.6		30 - 110	08/09/16 10:28	08/12/16 16:24	1

Lab Sample ID: LCS 160-264058/2-A

Matrix: Solid

Analysis Batch: 264794

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264058

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec.	Limits
Thorium-230	24.5	26.28		2.58	1.00	0.121	pCi/g	107	81 - 118

Tracer	LCS %Yield	LCS Qualifier	Limits
Thorium-229	87.7		30 - 110

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Lab Sample ID: 160-18504-1 DU

Matrix: Solid

Analysis Batch: 264961

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264058

Analyte	Sample	Sample	DU	DU	Total	RER	Limit		
	Result	Qual	Result	Qual	Uncert. (2σ+/-)	RL	MDC	Unit	
Thorium-228	1.79		1.497		0.212	1.00	0.0959	pCi/g	0.64
Thorium-230	1.70		1.632		0.219	1.00	0.0426	pCi/g	0.15
Thorium-232	1.63		1.335		0.190	1.00	0.0133	pCi/g	0.72
<i>Tracer</i>	<i>DU</i>	<i>DU</i>							
	%Yield	Qualifier		Limits					
Thorium-229	44.1			30 - 110					

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-264056/1-A

Matrix: Solid

Analysis Batch: 265017

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264056

Analyte	MB	MB	Count	Total	Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	
Uranium-233/234	0.02300	U	0.0325	0.0326	1.00	0.0515	pCi/g	08/09/16 10:32
Uranium-235/236	-0.002862	U	0.00572	0.00573	1.00	0.0554	pCi/g	08/09/16 10:32
Uranium-238	0.03443	U	0.0370	0.0371	1.00	0.0444	pCi/g	08/09/16 10:32
<i>Tracer</i>	<i>MB</i>	<i>MB</i>						
	%Yield	Qualifier		Limits				
Uranium-232	79.0			30 - 110				
	Prepared	Analyzed	Dil Fac					
	08/09/16 10:32	08/15/16 17:30	1					

Lab Sample ID: LCS 160-264056/2-A

Matrix: Solid

Analysis Batch: 265018

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264056

Analyte	Spike	LCS	LCS	Total	%Rec.	Limits		
	Added	Result	Qual	Uncert. (2σ+/-)	RL	MDC	Unit	
Uranium-233/234	6.37	6.057		0.707	1.00	0.0704	pCi/g	95
Uranium-238	6.51	6.566		0.751	1.00	0.0553	pCi/g	101
<i>Tracer</i>								
	LCS	LCS						
	%Yield	Qualifier		Limits				
Uranium-232	75.0			30 - 110				

Lab Sample ID: 160-18504-1 DU

Matrix: Solid

Analysis Batch: 265020

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264056

Analyte	Sample	Sample	DU	DU	Total	RER	Limit		
	Result	Qual	Result	Qual	Uncert. (2σ+/-)	RL	MDC	Unit	
Uranium-233/234	7.92		7.255		0.844	1.00	0.0659	pCi/g	0.38
Uranium-235/236	0.600		0.6150		0.197	1.00	0.0439	pCi/g	0.04
Uranium-238	23.4		21.01		2.03	1.00	0.0352	pCi/g	0.56

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: 160-18504-1 DU

Matrix: Solid

Analysis Batch: 265020

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264056

Tracer	DU DU		Limits
	%Yield	Qualifier	
Uranium-232	59.6		30 - 110

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-264040/1-A

Matrix: Solid

Analysis Batch: 264848

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264040

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Neptunium-237	0.003880	U	0.0165	0.0165	1.00	0.0435	pCi/g	08/09/16 10:28	08/12/16 16:30	1
Tracer										
Neptunium-239	%Yield		MB MB		Limits		Prepared		Analyzed	Dil Fac
	97.2		U		30 - 110			08/09/16 10:28	08/12/16 16:30	1

Lab Sample ID: LCS 160-264040/2-A

Matrix: Solid

Analysis Batch: 264849

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264040

Analyte	Spike		LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec.	Limits
	Added	Result								
Neptunium-237	3.88		3.798		0.458	1.00	0.0533	pCi/g	98	39 - 134
Tracer										
Neptunium-239	%Yield		LCS LCS		Limits		Prepared		Analyzed	Dil Fac
	108		U		30 - 110		08/09/16 10:28	08/12/16 16:30		1

Lab Sample ID: 160-18504-1 DU

Matrix: Solid

Analysis Batch: 264851

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264040

Analyte	Sample		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	Limit
	Result	Qual								
Neptunium-237	0.0245	U			0.01784	1.00	0.0400	pCi/g	0.11	1
Tracer										
Neptunium-239	%Yield		DU DU		Limits		Prepared		Analyzed	Dil Fac
	102		U		30 - 110		08/09/16 10:28	08/12/16 16:30		1

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Lab Sample ID: MB 160-264055/1-A

Matrix: Solid

Analysis Batch: 264839

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264055

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Plutonium-238	0.01879	U	0.0394	0.0394	1.00	0.0743	pCi/g	08/09/16 10:32	08/12/16 16:27	1
Plutonium-239/240	0.003761	U	0.0160	0.0160	1.00	0.0421	pCi/g	08/09/16 10:32	08/12/16 16:27	1
Tracer	MB MB		Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	%Yield	Qualifier	30 - 110					08/09/16 10:32	08/12/16 16:27	1

Lab Sample ID: LCS 160-264055/2-A

Matrix: Solid

Analysis Batch: 264840

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264055

Analyte	Spike		LCS Added	LCS Result	LCS Qual	Total			%Rec.	Limits
	Added	Result				Uncert. (2σ+/-)	RL	MDC		
Plutonium-238		5.38		5.292		0.591	1.00	0.0688	pCi/g	98
Plutonium-239/2		6.60		6.834		0.725	1.00	0.0401	pCi/g	103
40										
Tracer	LCS LCS		Limits							
Pu-242 (T)	%Yield	Qualifier	30 - 110							

Lab Sample ID: 160-18504-1 DU

Matrix: Solid

Analysis Batch: 264842

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264055

Analyte	Sample		DU Result	DU Result	DU Qual	Total			RER	Limit
	Result	Qual				Uncert. (2σ+/-)	RL	MDC		
Plutonium-238	0.313			0.2976		0.0955	1.00	0.0513	pCi/g	0.08
Plutonium-239/2	0.0669			0.06678		0.0464	1.00	0.0487	pCi/g	0
40										
Tracer	DU DU		Limits							
Pu-242 (T)	%Yield	Qualifier	30 - 110							

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Lab Sample ID: MB 160-264041/1-A

Matrix: Solid

Analysis Batch: 265256

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264041

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Americium-241	0.04711	U	0.0705	0.0707	1.00	0.121	pCi/g	08/09/16 10:32	08/16/16 16:19	1
Tracer	MB MB		Limits					Prepared	Analyzed	Dil Fac
Americium-243	%Yield	Qualifier	30 - 110					08/09/16 10:32	08/16/16 16:19	1

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry) (Continued)

Lab Sample ID: LCS 160-264041/2-A

Matrix: Solid

Analysis Batch: 265229

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264041

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		MDC	Unit	%Rec	%Rec. Limits
		Result	Qual		RL	Unit				
Americium-241	3.73	3.269		0.508	1.00	pCi/g	0.113	pCi/g	88	67 - 120
<i>Tracer</i>										
<i>LCS LCS</i>										
<i>%Yield Qualifier Limits</i>										
Americium-24	47.2			30 - 110						
3										

Lab Sample ID: 160-18504-1 DU

Matrix: Solid

Analysis Batch: 265231

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264041

Analyte	Sample		DU		Uncert. (2σ+/-)	Total		RER	RER Limit	
	Result	Qual	Result	Qual		RL	MDC	Unit		
Americium-241	0.123		0.09345		0.0520	1.00	0.0508	pCi/g	0.26	1
<i>Tracer</i>										
<i>DU DU</i>										
<i>%Yield Qualifier Limits</i>										
Americium-24	77.9		30 - 110							
3										

Method: H3-04-RC - Tritium (LSC)

Lab Sample ID: MB 160-265032/1-A

Matrix: Solid

Analysis Batch: 265517

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 265032

Analyte	MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Tritium	0.05758	U	0.180	0.180	1.00	0.313	pCi/g	08/16/16 11:01	08/18/16 11:52	1

Lab Sample ID: LCS 160-265032/2-A

Matrix: Solid

Analysis Batch: 265517

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 265032

Analyte	Spike		LCS Result	LCS Qual	Uncert. (2σ+/-)	Total		%Rec	%Rec. Limits	
	Added	Result				RL	MDC	Unit		
Tritium	10.1	10.13			1.12	1.00	0.312	pCi/g	100	80 - 114

Lab Sample ID: 160-18352-D-5-J MS

Matrix: Solid

Analysis Batch: 265517

Client Sample ID: Matrix Spike

Prep Type: Total/NA

Prep Batch: 265032

Analyte	Sample		Spike Added	MS		Uncert. (2σ+/-)	Total		%Rec	%Rec. Limits	
	Result	Qual		Result	Qual		RL	MDC	Unit		
Tritium	0.0858	U	10.1	6.357	N	0.790	1.00	0.327	pCi/g	63	78 - 122

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: H3-04-RC - Tritium (LSC) (Continued)

Lab Sample ID: 160-18352-B-2-Y DU

Matrix: Solid

Analysis Batch: 265517

Client Sample ID: Duplicate

Prep Type: Total/NA

Prep Batch: 265032

Analyte	Sample	Sample	DU	DU	Total	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)		
Tritium	0.249	U	0.1152	U	0.192	1.00	0.327 pCi/g

Method: SR-03-RC - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-264358/1-A

Matrix: Solid

Analysis Batch: 264773

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264358

Analyte	MB	MB	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium 89/90	0.1155	U	0.180	0.180	3.00	0.302	pCi/g	08/10/16 21:28	08/15/16 20:49	1
Carrier	MB	MB						Prepared	Analyzed	Dil Fac
Sr Carrier	%Yield	Qualifier	Limits					08/10/16 21:28	08/15/16 20:49	1

Lab Sample ID: LCS 160-264358/2-A

Matrix: Solid

Analysis Batch: 265358

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264358

Analyte	Spike	LCS	LCS	Total	RL	MDC	Unit	%Rec	Limits
	Added	Result	Qual	Uncert. (2σ+/-)					
Strontium 89/90		8.61	7.395	0.634	3.00	0.135	pCi/g	86	75 - 125
Carrier	LCS	LCS							
Sr Carrier	%Yield	Qualifier	Limits						

Lab Sample ID: 160-18504-1 DU

Matrix: Solid

Analysis Batch: 264773

Client Sample ID: YMTFA39SE001

Prep Type: Total/NA

Prep Batch: 264358

Analyte	Sample	Sample	DU	DU	Total	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)		
Strontium 89/90	-0.00786	U	0.03261	U	0.144	3.00	0.252 pCi/g
Carrier	DU	DU					
Sr Carrier	%Yield	Qualifier	Limits				

Lab Sample ID: MB 160-264909/1-A

Matrix: Solid

Analysis Batch: 265158

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264909

Analyte	MB	MB	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium 89/90	0.1997	U	0.293	0.293	3.00	0.490	pCi/g	08/15/16 21:31	08/17/16 11:56	1

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: SR-03-RC - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: MB 160-264909/1-A

Matrix: Solid

Analysis Batch: 265158

Carrier	%Yield	MB MB Qualifer	Limits
Sr Carrier	86.2		40 - 110

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264909

Lab Sample ID: LCS 160-264909/2-A

Matrix: Solid

Analysis Batch: 265158

Analyte	Spike Added	LCS		Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec.	Limits
		Result	Qual						
Strontium 89/90	17.2	15.20		1.39	3.00	0.415	pCi/g	88	75 - 125

Carrier

Carrier	%Yield	MB MB Qualifer	Limits
Sr Carrier	88.3		40 - 110

Lab Sample ID: 160-18504-3 DU

Matrix: Solid

Analysis Batch: 265158

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	Limit
	Result	Qual	Result	Qual	(2σ+/-)					
Strontium 89/90	0.270	U	-0.1068	U	0.230	3.00	0.432	pCi/g	0.76	1
Carrier										
Carrier	%Yield	MB MB Qualifer	Limits		RL	MDC	Unit	RER	Limit	1
	89.3		40 - 110							

Method: TC-02-RC - Technetium-99 (LSC)

Lab Sample ID: MB 160-264549/1-A

Matrix: Solid

Analysis Batch: 265093

Analyte	MB Result	MB Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Technetium-99	-0.06754	U	0.258	0.258	1.00	0.455	pCi/g	08/11/16 16:14	08/16/16 13:13	1
Tracer										
Tracer	%Yield	MB MB Qualifer	Limits		RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	98.7		30 - 110							

Lab Sample ID: LCS 160-264549/2-A

Matrix: Solid

Analysis Batch: 265093

Analyte	Spike Added	LCS		Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec.	Limits
		Result	Qual						
Technetium-99	33.9	35.41		3.59	1.00	0.497	pCi/g	104	75 - 125

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 264549

TestAmerica St. Louis

QC Sample Results

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: TC-02-RC - Technetium-99 (LSC) (Continued)

Lab Sample ID: LCS 160-264549/2-A

Matrix: Solid

Analysis Batch: 265093

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 264549

Tracer	LCS %Yield	LCS Qualifier	Limits
Tc-99m	90.7		30 - 110

Lab Sample ID: 160-18504-3 DU

Matrix: Solid

Analysis Batch: 265093

Client Sample ID: YMTFA41SE001

Prep Type: Total/NA

Prep Batch: 264549

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	RER	Limit
Technetium-99	0.261	U	0.3121	U	0.208	1.00	0.327	pCi/g	0.12	1

Tracer	DU %Yield	DU Qualifier	Limits
Tc-99m	93.9		30 - 110

TestAmerica St. Louis

QC Association Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

GC/MS VOA

Leach Batch: 263916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	1311	
160-18504-2	YMTFA40SE001	TCLP	Solid	1311	
160-18504-3	YMTFA41SE001	TCLP	Solid	1311	
160-18504-4	YMTFA73SE001	TCLP	Solid	1311	
LB 160-263916/1-A	Method Blank	TCLP	Solid	1311	
160-18420-C-2-A MS	Matrix Spike	TCLP	Solid	1311	
160-18420-C-2-A MSD	Matrix Spike Duplicate	TCLP	Solid	1311	

Analysis Batch: 264101

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	8260C	263916
160-18504-2	YMTFA40SE001	TCLP	Solid	8260C	263916
160-18504-3	YMTFA41SE001	TCLP	Solid	8260C	263916
160-18504-4	YMTFA73SE001	TCLP	Solid	8260C	263916
LB 160-263916/1-A	Method Blank	TCLP	Solid	8260C	263916
LCS 160-264101/12	Lab Control Sample	Total/NA	Solid	8260C	
160-18420-C-2-A MS	Matrix Spike	TCLP	Solid	8260C	263916
160-18420-C-2-A MSD	Matrix Spike Duplicate	TCLP	Solid	8260C	263916

GC/MS Semi VOA

Leach Batch: 263996

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	1311	
160-18504-2	YMTFA40SE001	TCLP	Solid	1311	
160-18504-3	YMTFA41SE001	TCLP	Solid	1311	
160-18504-4	YMTFA73SE001	TCLP	Solid	1311	

Leach Batch: 264009

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18420-B-1-G MS	Matrix Spike	TCLP	Solid	1311	
160-18420-B-1-H MSD	Matrix Spike Duplicate	TCLP	Solid	1311	

Leach Batch: 264502

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 160-264502/1-B	Method Blank	TCLP	Solid	1311	

Prep Batch: 264673

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	3510C	263996
160-18504-2	YMTFA40SE001	TCLP	Solid	3510C	263996
160-18504-3	YMTFA41SE001	TCLP	Solid	3510C	263996
160-18504-4	YMTFA73SE001	TCLP	Solid	3510C	263996
LB 160-264502/1-B	Method Blank	TCLP	Solid	3510C	264502
LCS 160-264673/2-A	Lab Control Sample	Total/NA	Solid	3510C	
160-18420-B-1-G MS	Matrix Spike	TCLP	Solid	3510C	264009
160-18420-B-1-H MSD	Matrix Spike Duplicate	TCLP	Solid	3510C	264009

TestAmerica St. Louis

QC Association Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

GC/MS Semi VOA (Continued)

Analysis Batch: 264877

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	8270D	264673
160-18504-2	YMTFA40SE001	TCLP	Solid	8270D	264673
160-18504-3	YMTFA41SE001	TCLP	Solid	8270D	264673
160-18504-4	YMTFA73SE001	TCLP	Solid	8270D	264673
LB 160-264502/1-B	Method Blank	TCLP	Solid	8270D	264673
LCS 160-264673/2-A	Lab Control Sample	Total/NA	Solid	8270D	264673
160-18420-B-1-G MS	Matrix Spike	TCLP	Solid	8270D	264673
160-18420-B-1-H MSD	Matrix Spike Duplicate	TCLP	Solid	8270D	264673

GC Semi VOA

Leach Batch: 263996

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	1311	11
160-18504-2	YMTFA40SE001	TCLP	Solid	1311	12
160-18504-3	YMTFA41SE001	TCLP	Solid	1311	13
160-18504-4	YMTFA73SE001	TCLP	Solid	1311	14
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	1311	15
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	1311	

Leach Batch: 264502

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LB 160-264502/1-C	Method Blank	TCLP	Solid	1311	

Prep Batch: 264676

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	8151A	263996
160-18504-2	YMTFA40SE001	TCLP	Solid	8151A	263996
160-18504-3	YMTFA41SE001	TCLP	Solid	8151A	263996
160-18504-4	YMTFA73SE001	TCLP	Solid	8151A	263996
LB 160-264502/1-C	Method Blank	TCLP	Solid	8151A	264502
LCS 160-264676/2-A	Lab Control Sample	Total/NA	Solid	8151A	
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	8151A	263996
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	8151A	263996

Prep Batch: 264775

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	3550C	
160-18504-2	YMTFA40SE001	Total/NA	Solid	3550C	
160-18504-3	YMTFA41SE001	Total/NA	Solid	3550C	
160-18504-4	YMTFA73SE001	Total/NA	Solid	3550C	
MB 160-264775/1-A	Method Blank	Total/NA	Solid	3550C	
LCS 160-264775/2-A	Lab Control Sample	Total/NA	Solid	3550C	
160-18504-1 MS	YMTFA39SE001	Total/NA	Solid	3550C	
160-18504-1 MSD	YMTFA39SE001	Total/NA	Solid	3550C	

Analysis Batch: 265137

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 160-264775/1-A	Method Blank	Total/NA	Solid	8082A	264775
LCS 160-264775/2-A	Lab Control Sample	Total/NA	Solid	8082A	264775

TestAmerica St. Louis

QC Association Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

GC Semi VOA (Continued)

Analysis Batch: 265408

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	8151A	264676
160-18504-2	YMTFA40SE001	TCLP	Solid	8151A	264676
160-18504-3	YMTFA41SE001	TCLP	Solid	8151A	264676
160-18504-4	YMTFA73SE001	TCLP	Solid	8151A	264676
LB 160-264502/1-C	Method Blank	TCLP	Solid	8151A	264676
LCS 160-264676/2-A	Lab Control Sample	Total/NA	Solid	8151A	264676
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	8151A	264676
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	8151A	264676

Analysis Batch: 265549

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	8082A	264775
160-18504-2	YMTFA40SE001	Total/NA	Solid	8082A	264775
160-18504-3	YMTFA41SE001	Total/NA	Solid	8082A	264775
160-18504-4	YMTFA73SE001	Total/NA	Solid	8082A	264775
160-18504-1 MS	YMTFA39SE001	Total/NA	Solid	8082A	264775
160-18504-1 MSD	YMTFA39SE001	Total/NA	Solid	8082A	264775

Metals

Leach Batch: 263996

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	1311	
160-18504-2	YMTFA40SE001	TCLP	Solid	1311	
160-18504-3	YMTFA41SE001	TCLP	Solid	1311	
160-18504-4	YMTFA73SE001	TCLP	Solid	1311	
LB 160-263996/1-B	Method Blank	TCLP	Solid	1311	
LB 160-263996/1-C	Method Blank	TCLP	Solid	1311	
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	1311	
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	1311	

Prep Batch: 264871

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	3010A	263996
160-18504-2	YMTFA40SE001	TCLP	Solid	3010A	263996
160-18504-3	YMTFA41SE001	TCLP	Solid	3010A	263996
160-18504-4	YMTFA73SE001	TCLP	Solid	3010A	263996
LB 160-263996/1-B	Method Blank	TCLP	Solid	3010A	263996
LCS 160-264871/2-A	Lab Control Sample	Total/NA	Solid	3010A	
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	3010A	263996
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	3010A	263996

Prep Batch: 265037

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	7470A	263996
160-18504-2	YMTFA40SE001	TCLP	Solid	7470A	263996
160-18504-3	YMTFA41SE001	TCLP	Solid	7470A	263996
160-18504-4	YMTFA73SE001	TCLP	Solid	7470A	263996
LB 160-263996/1-C	Method Blank	TCLP	Solid	7470A	263996
LCS 160-265037/2-A	Lab Control Sample	Total/NA	Solid	7470A	

TestAmerica St. Louis

QC Association Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Metals (Continued)

Prep Batch: 265037 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	7470A	263996
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	7470A	263996

Analysis Batch: 265144

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	6010C	264871
160-18504-2	YMTFA40SE001	TCLP	Solid	6010C	264871
160-18504-3	YMTFA41SE001	TCLP	Solid	6010C	264871
160-18504-4	YMTFA73SE001	TCLP	Solid	6010C	264871
LB 160-263996/1-B	Method Blank	TCLP	Solid	6010C	264871
LCS 160-264871/2-A	Lab Control Sample	Total/NA	Solid	6010C	264871
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	6010C	264871
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	6010C	264871

Analysis Batch: 265178

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	TCLP	Solid	7470A	265037
160-18504-2	YMTFA40SE001	TCLP	Solid	7470A	265037
160-18504-3	YMTFA41SE001	TCLP	Solid	7470A	265037
160-18504-4	YMTFA73SE001	TCLP	Solid	7470A	265037
LB 160-263996/1-C	Method Blank	TCLP	Solid	7470A	265037
LCS 160-265037/2-A	Lab Control Sample	Total/NA	Solid	7470A	265037
160-18504-1 MS	YMTFA39SE001	TCLP	Solid	7470A	265037
160-18504-1 MSD	YMTFA39SE001	TCLP	Solid	7470A	265037

General Chemistry

Analysis Batch: 263991

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	Moisture	
160-18504-2	YMTFA40SE001	Total/NA	Solid	Moisture	
160-18504-3	YMTFA41SE001	Total/NA	Solid	Moisture	
160-18504-4	YMTFA73SE001	Total/NA	Solid	Moisture	
160-18461-A-2 DU	Duplicate	Total/NA	Solid	Moisture	

Rad

Leach Batch: 263919

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	Dry and Grind	
160-18504-2	YMTFA40SE001	Total/NA	Solid	Dry and Grind	
160-18504-3	YMTFA41SE001	Total/NA	Solid	Dry and Grind	
160-18504-4	YMTFA73SE001	Total/NA	Solid	Dry and Grind	
160-18504-1 DU	YMTFA39SE001	Total/NA	Solid	Dry and Grind	
160-18504-3 DU	YMTFA41SE001	Total/NA	Solid	Dry and Grind	

Prep Batch: 264040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	A-01-R	263919
160-18504-2	YMTFA40SE001	Total/NA	Solid	A-01-R	263919

TestAmerica St. Louis

QC Association Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Rad (Continued)

Prep Batch: 264040 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-3	YMTFA41SE001	Total/NA	Solid	A-01-R	263919
160-18504-4	YMTFA73SE001	Total/NA	Solid	A-01-R	263919
MB 160-264040/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-264040/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18504-1 DU	YMTFA39SE001	Total/NA	Solid	A-01-R	263919

Prep Batch: 264041

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919
160-18504-2	YMTFA40SE001	Total/NA	Solid	ExtChrom	263919
160-18504-3	YMTFA41SE001	Total/NA	Solid	ExtChrom	263919
160-18504-4	YMTFA73SE001	Total/NA	Solid	ExtChrom	263919
MB 160-264041/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-264041/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18504-1 DU	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919

Prep Batch: 264055

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919
160-18504-2	YMTFA40SE001	Total/NA	Solid	ExtChrom	263919
160-18504-3	YMTFA41SE001	Total/NA	Solid	ExtChrom	263919
160-18504-4	YMTFA73SE001	Total/NA	Solid	ExtChrom	263919
MB 160-264055/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-264055/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18504-1 DU	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919

Prep Batch: 264056

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919
160-18504-2	YMTFA40SE001	Total/NA	Solid	ExtChrom	263919
160-18504-3	YMTFA41SE001	Total/NA	Solid	ExtChrom	263919
160-18504-4	YMTFA73SE001	Total/NA	Solid	ExtChrom	263919
MB 160-264056/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-264056/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18504-1 DU	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919

Prep Batch: 264058

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919
160-18504-2	YMTFA40SE001	Total/NA	Solid	ExtChrom	263919
160-18504-3	YMTFA41SE001	Total/NA	Solid	ExtChrom	263919
160-18504-4	YMTFA73SE001	Total/NA	Solid	ExtChrom	263919
MB 160-264058/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-264058/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	
160-18504-1 DU	YMTFA39SE001	Total/NA	Solid	ExtChrom	263919

Prep Batch: 264358

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	DPS-0	263919
160-18504-2	YMTFA40SE001	Total/NA	Solid	DPS-0	263919
160-18504-4	YMTFA73SE001	Total/NA	Solid	DPS-0	263919

TestAmerica St. Louis

QC Association Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Rad (Continued)

Prep Batch: 264358 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 160-264358/1-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-264358/2-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-18504-1 DU	YMTFA39SE001	Total/NA	Solid	DPS-0	263919

Prep Batch: 264549

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	Ext_Chrom_LSC	
160-18504-2	YMTFA40SE001	Total/NA	Solid	Ext_Chrom_LSC	
160-18504-3	YMTFA41SE001	Total/NA	Solid	Ext_Chrom_LSC	
160-18504-4	YMTFA73SE001	Total/NA	Solid	Ext_Chrom_LSC	
MB 160-264549/1-A	Method Blank	Total/NA	Solid	Ext_Chrom_LSC	
LCS 160-264549/2-A	Lab Control Sample	Total/NA	Solid	Ext_Chrom_LSC	
160-18504-3 DU	YMTFA41SE001	Total/NA	Solid	Ext_Chrom_LSC	

Prep Batch: 264909

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-3	YMTFA41SE001	Total/NA	Solid	DPS-0	263919
MB 160-264909/1-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-264909/2-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-18504-3 DU	YMTFA41SE001	Total/NA	Solid	DPS-0	263919

Prep Batch: 265032

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-18504-1	YMTFA39SE001	Total/NA	Solid	LSC_Dist_Susp	
160-18504-2	YMTFA40SE001	Total/NA	Solid	LSC_Dist_Susp	
160-18504-3	YMTFA41SE001	Total/NA	Solid	LSC_Dist_Susp	
160-18504-4	YMTFA73SE001	Total/NA	Solid	LSC_Dist_Susp	
MB 160-265032/1-A	Method Blank	Total/NA	Solid	LSC_Dist_Susp	
LCS 160-265032/2-A	Lab Control Sample	Total/NA	Solid	LSC_Dist_Susp	
160-18352-D-5-J MS	Matrix Spike	Total/NA	Solid	LSC_Dist_Susp	
160-18352-B-2-Y DU	Duplicate	Total/NA	Solid	LSC_Dist_Susp	

Surrogate Summary

Client: Alliant Corporation

TestAmerica Job ID: 160-18504-1

Project/Site: ORNL Y-12 Outfall 200 Characterization

Method: 8260C - Volatile Organic Compounds by GC/MS

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)			
		BFB (84-120)	12DCE (83-117)	TOL (85-115)	DBFM (85-115)
LCS 160-264101/12	Lab Control Sample	97	102	99	100

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

12DCE = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

DBFM = Dibromofluoromethane (Surr)

Method: 8260C - Volatile Organic Compounds by GC/MS

Matrix: Solid

Prep Type: TCLP

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)			
		BFB (84-120)	12DCE (83-117)	TOL (85-115)	DBFM (85-115)
160-18420-C-2-A MS	Matrix Spike	100	105	102	103
160-18420-C-2-A MSD	Matrix Spike Duplicate	98	102	100	101
160-18504-1	YMTFA39SE001	97	105	97	97
160-18504-2	YMTFA40SE001	99	107	100	100
160-18504-3	YMTFA41SE001	98	106	98	100
160-18504-4	YMTFA73SE001	97	107	99	99
LB 160-263916/1-A	Method Blank	97	102	97	100

Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

12DCE = 1,2-Dichloroethane-d4 (Surr)

TOL = Toluene-d8 (Surr)

DBFM = Dibromofluoromethane (Surr)

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		TBP (49-100)	NBZ (51-98)	PHL (37-95)	TPH (60-113)	FBP (45-94)	2FP (46-92)
LCS 160-264673/2-A	Lab Control Sample	92	84	78	104	87	79

Surrogate Legend

TBP = 2,4,6-Tribromophenol (Surr)

NBZ = Nitrobenzene-d5 (Surr)

PHL = Phenol-d5 (Surr)

TPH = Terphenyl-d14 (Surr)

FBP = 2-Fluorobiphenyl (Surr)

2FP = 2-Fluorophenol (Surr)

TestAmerica St. Louis

Surrogate Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8270D - Semivolatile Organic Compounds (GC/MS)

Matrix: Solid

Prep Type: TCLP

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		TBP (49-100)	NBZ (51-98)	PHL (37-95)	TPH (60-113)	FBP (45-94)	2FP (46-92)
160-18420-B-1-G MS	Matrix Spike	84	79	70	102	80	67
160-18420-B-1-H MSD	Matrix Spike Duplicate	76	76	68	98	80	64
160-18504-1	YMTFA39SE001	83	85	76	108	85	77
160-18504-2	YMTFA40SE001	73	77	55	91	77	60
160-18504-3	YMTFA41SE001	85	87	61	100	87	68
160-18504-4	YMTFA73SE001	73	75	53	98	76	59
LB 160-264502/1-B	Method Blank	101 S	93	82	112	92	84

Surrogate Legend

TBP = 2,4,6-Tribromophenol (Surr)

NBZ = Nitrobenzene-d5 (Surr)

PHL = Phenol-d5 (Surr)

TPH = Terphenyl-d14 (Surr)

FBP = 2-Fluorobiphenyl (Surr)

2FP = 2-Fluorophenol (Surr)

Method: 8082A - Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		DCB1 (23-146)					
160-18504-1	YMTFA39SE001	104					
160-18504-1 MS	YMTFA39SE001	76 J					
160-18504-1 MSD	YMTFA39SE001	101					
160-18504-2	YMTFA40SE001	127					
160-18504-3	YMTFA41SE001	104					
160-18504-4	YMTFA73SE001	73					
LCS 160-264775/2-A	Lab Control Sample	106					
MB 160-264775/1-A	Method Blank	101					

Surrogate Legend

DCB = DCB Decachlorobiphenyl (Surr)

Method: 8151A - Herbicides (GC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Surrogate Recovery (Acceptance Limits)					
		DCPA2 (56-147)					
LCS 160-264676/2-A	Lab Control Sample	115					

Surrogate Legend

DCPA = 2,4-Dichlorophenylacetic acid

TestAmerica St. Louis

Surrogate Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: 8151A - Herbicides (GC)

Matrix: Solid

Prep Type: TCLP

		Percent Surrogate Recovery (Acceptance Limits)				
Lab Sample ID	Client Sample ID	DCPA2				
		(56-147)				
160-18504-1	YMTFA39SE001	96				
160-18504-1 MS	YMTFA39SE001	94				
160-18504-1 MSD	YMTFA39SE001	107				
160-18504-2	YMTFA40SE001	118				
160-18504-3	YMTFA41SE001	95				
160-18504-4	YMTFA73SE001	112				
LB 160-264502/1-C	Method Blank	78				

Surrogate Legend

DCPA = 2,4-Dichlorophenylacetic acid

Tracer/Carrier Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: A-01-R - Isotopic Curium and/or Americium 241 (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Am-243

Lab Sample ID	Client Sample ID	(30-110)
160-18504-1	YMTFA39SE001	78.0
160-18504-1 DU	YMTFA39SE001	77.9
160-18504-2	YMTFA40SE001	80.8
160-18504-3	YMTFA41SE001	67.9
160-18504-4	YMTFA73SE001	75.1
LCS 160-264041/2-A	Lab Control Sample	47.2
MB 160-264041/1-A	Method Blank	42.6

Tracer/Carrier Legend

Am-243 = Americium-243

Method: A-01-R - Isotopic Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Np-239

Lab Sample ID	Client Sample ID	(30-110)
160-18504-1	YMTFA39SE001	103
160-18504-1 DU	YMTFA39SE001	102
160-18504-2	YMTFA40SE001	100
160-18504-3	YMTFA41SE001	99.3
160-18504-4	YMTFA73SE001	94.3
LCS 160-264040/2-A	Lab Control Sample	108
MB 160-264040/1-A	Method Blank	97.2

Tracer/Carrier Legend

Np-239 = Neptunium-239

Method: A-01-R - Isotopic Plutonium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Pu-242 (T)

Lab Sample ID	Client Sample ID	(30-110)
160-18504-1	YMTFA39SE001	98.9
160-18504-1 DU	YMTFA39SE001	109
160-18504-2	YMTFA40SE001	90.7
160-18504-3	YMTFA41SE001	91.4
160-18504-4	YMTFA73SE001	103
LCS 160-264055/2-A	Lab Control Sample	104
MB 160-264055/1-A	Method Blank	98.8

Tracer/Carrier Legend

Pu-242 (T) = Pu-242 (T)

TestAmerica St. Louis

Tracer/Carrier Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Th-229 (30-110)	Percent Yield (Acceptance Limits)
160-18504-1	YMTFA39SE001	37.7	_____
160-18504-1 DU	YMTFA39SE001	44.1	_____
160-18504-2	YMTFA40SE001	72.1	_____
160-18504-3	YMTFA41SE001	50.6	_____
160-18504-4	YMTFA73SE001	28.7 S	_____
LCS 160-264058/2-A	Lab Control Sample	87.7	_____
MB 160-264058/1-A	Method Blank	87.6	_____

Tracer/Carrier Legend

Th-229 = Thorium-229

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	U-232 (30-110)	Percent Yield (Acceptance Limits)
160-18504-1	YMTFA39SE001	62.6	_____
160-18504-1 DU	YMTFA39SE001	59.6	_____
160-18504-2	YMTFA40SE001	70.9	_____
160-18504-3	YMTFA41SE001	54.2	_____
160-18504-4	YMTFA73SE001	58.0	_____
LCS 160-264056/2-A	Lab Control Sample	75.0	_____
MB 160-264056/1-A	Method Blank	79.0	_____

Tracer/Carrier Legend

U-232 = Uranium-232

Method: SR-03-RC - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (C) (40-110)	Percent Yield (Acceptance Limits)
160-18504-1	YMTFA39SE001	60.9	_____
160-18504-1 DU	YMTFA39SE001	75.1	_____
160-18504-2	YMTFA40SE001	79.9	_____
160-18504-3	YMTFA41SE001	89.0	_____
160-18504-3 DU	YMTFA41SE001	89.3	_____
160-18504-4	YMTFA73SE001	70.0	_____
LCS 160-264358/2-A	Lab Control Sample	89.5	_____
LCS 160-264909/2-A	Lab Control Sample	88.3	_____
MB 160-264358/1-A	Method Blank	62.9	_____
MB 160-264909/1-A	Method Blank	86.2	_____

Tracer/Carrier Legend

Sr (C) = Sr Carrier

TestAmerica St. Louis

Tracer/Carrier Summary

Client: Alliant Corporation

Project/Site: ORNL Y-12 Outfall 200 Characterization

TestAmerica Job ID: 160-18504-1

Method: TC-02-RC - Technetium-99 (LSC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)				
		Tc-99m (30-110)				
160-18504-1	YMTFA39SE001	93.2				
160-18504-2	YMTFA40SE001	90.7				
160-18504-3	YMTFA41SE001	87.4				
160-18504-3 DU	YMTFA41SE001	93.9				
160-18504-4	YMTFA73SE001	90.4				
LCS 160-264549/2-A	Lab Control Sample	90.7				
MB 160-264549/1-A	Method Blank	98.7				

Tracer/Carrier Legend

Tc-99m = Tc-99m

1
2
Analytical Data Package Prepared For

3
4
5
6
7
TESTAMERICA ST. LOUIS

8
9
10
11
12
13
14
15
Radiochemical Analysis By
TestAmerica Inc

2800 G.W. Way, Richland Wa, 99354, (509)-375-3131.

Assigned Laboratory Code: TA-RL

Data Package Contains _____ Pages

Report No.: 69207

Results in this report relate only to the sample(s) analyzed.

SDG No.	Order No.	Client Sample ID (List Order)	Lot-Sa No.	Work Order	Report DB ID	Batch No.
	51942	YMTFA39SE001(160-18504-1)	J6H150411-1	M84A91AA	9M84A910	6228062
		YMTFA40SE001(160-18504-2)	J6H150411-2	M84CA1AA	9M84CA10	6228062
		YMTFA41SE001(160-18504-3)	J6H150411-3	M84CC1AA	9M84CC10	6228062
		YMTFA73SE001(160-18504-4)	J6H150411-4	M84CD1AA	9M84CD10	6228062



Certificate of Analysis

August 25, 2016

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045

Attention: Erika Gish

Date Received in Lab	:	August 9, 2016
Sample Type	:	Four(4) Solid
SDG Number	:	51942
Job Number	:	160-18504-1
Project Number/Name	:	16005502/ORNL Y-12 Outfall 200 Characterization

CASE NARRATIVE

I. Introduction

On August 9, 2016, four solid samples were received at the TestAmerica Richland laboratory for radiochemical analysis. Upon receipt the samples were assigned to Lot Number J6H150411 with the laboratory ID number corresponding to the client ID as shown on the cover page.

II. Sample Receipt

The samples were received in good condition; no anomalies were noted upon check-in.

III. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information; analytical results and the appropriate associated statistical uncertainties.

The analyses requested were:

Liquid Scintillation Counting
Carbon-14 by method RL-LSC-008

IV. Quality Control

The analytical result for each analysis performed includes a minimum of one laboratory control sample (LCS), and one reagent blank sample analysis. Any exceptions have been noted in the "Comments" section.

V. Comments

Liquid Scintillation Counting

Carbon-14 by method RL-LSC-008:

The LCS, batch blank, sample duplicate, and sample results are within acceptance limits.

I certify that this Certificate of Analysis is in compliance with the SOW and/or NELAC, both technically and for completeness, for other than the conditions detailed above. The Laboratory Manager or a designee, as verified by the following signature has authorized release of the data contained in this hard copy data package.

Reviewed and approved:

Roger A. Stringer
Project Manager

Drinking Water Method Cross References

DRINKING WATER ASTM METHOD CROSS REFERENCES		
Referenced Method	Isotope(s)	TestAmerica Richland's SOP No.
EPA 901.1	Cs-134, I-131	RL-GAM-001
EPA 900.0	Alpha & Beta	RL-GPC-001
EPA 00-02	Gross Alpha (Coprecipitation)	RL-GPC-002
EPA 903.0	Total Alpha Radium (Ra-226)	RL-RA-002
EPA 903.1	Ra-226	RL-RA-001
EPA 904.0	Ra-228	RL-RA-001
EPA 905.0	Sr-89/90	RL-GPC-003
ASTM D5174	Uranium	RL-KPA-003
EPA 906.0	Tritium	RL-LSC-005

Results in this report relate only to the sample(s) analyzed.

Uncertainty Estimation

TestAmerica Richland has adopted the internationally accepted approach to estimating uncertainties described in "NIST Technical Note 1297, 1994 Edition". The approach, "Law of Propagation of Errors", involves the identification of all variables in an analytical method which are used to derive a result. These variables are related to the analytical result (R) by some functional relationship, $R = \text{constants} * f(x,y,z,...)$. The components (x,y,z) are evaluated to determine their contribution to the overall method uncertainty. The individual component uncertainties (u_i) are then combined using a statistical model that provides the most probable overall uncertainty value. All component uncertainties are categorized as type A, evaluated by statistical methods, or type B, evaluated by other means. Uncertainties not included in the components, such as sample homogeneity, are combined with the component uncertainty as the square root of the sum-of-the-squares of the individual uncertainties. The uncertainty associated with the derived result is the combined uncertainty (u_c) multiplied by the coverage factor (1,2, or 3).

When three or more sample replicates are used to derive the analytical result, the type A uncertainty is the standard deviation of the mean value (S/\sqrt{n}), where S is the standard deviation of the derived results. The type B uncertainties are all other random or non-random components that are not included in the standard deviation.

The derivation of the general "Law of Propagation of Errors" equations and specific example are available on request.

Report Definitions

Action Lev	An agreed upon activity level used to trigger some action when the final result is greater than or equal to the Action Level. Often the Action Level is related to the Decision Limit.
Batch	The QC preparation batch number that relates laboratory samples to QC samples that were prepared and analyzed together.
Bias	Defined by the equation (Result/Expected)-1 as defined by ANSI N13.30.
COC No	Chain of Custody Number assigned by the Client or TestAmerica.
Count Error (#s)	Poisson counting statistics of the gross sample count and background. The uncertainty is absolute and in the same units as the result. For Liquid Scintillation Counting (LSC) the batch blank count is the background.
CSU (#s) <i>u_c Combined Standard Uncert.</i>	All known uncertainties associated with the preparation and analysis of the sample are propagated to give a measure of the uncertainty associated with the result, <i>u_c the combined standard uncertainty</i> . The uncertainty is absolute and in the same units as the result.
(#s), Coverage Factor	The coverage factor defines the width of the confidence interval, 1, 2 or 3 standard deviations.
CRDL (RL)	Contractual Required Detection Limit as defined in the Client's Statement Of Work or TestAmerica "default" nominal detection limit. Often referred to the reporting level (RL)
Lc	Decision Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume associated with the sample. The Type I error probability is approximately 5%. Lc=(1.645 * Sqrt(2*(BkgrndCnt/BkgrndCntMin)/SCntMin)) * (ConvFct/(Eff*Yld*Abn*Vol) * IngrFct). For LSC methods the batch blank is used as a measure of the background variability. Lc cannot be calculated when the background count is zero.
Lot-Sample No	The number assigned by the LIMS software to track samples received on the same day for a given client. The sample number is a sequential number assigned to each sample in the Lot.
MDC MDA MDL	Detection Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume with a Type I and II error probability of approximately 5%. MDC = (4.65 * Sqrt((BkgrndCnt/BkgrndCntMin)/SCntMin) + 2.71/SCntMin) * (ConvFct/(Eff * Yld * Abn * Vol) * IngrFct). For LSC methods the batch blank is used as a measure of the background variability.
Primary Detector	The instrument identifier associated with the analysis of the sample aliquot.
Ratio U-234/U-238	The U-234 result divided by the U-238 result. The U-234/U-238 ratio for natural uranium in NIST SRM 4321C is 1.038.
Rst/MDC	Ratio of the Result to the MDC. A value greater than 1 may indicate activity above background at a high level of confidence. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Rst/TotUcert	Ratio of the Result to the Total Uncertainty. If the uncertainty has a coverage factor of 2 a value greater than 1 may indicate activity above background at approximately the 95% level of confidence assuming a two-sided confidence interval. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Report DB No	Sample Identifier used by the report system. The number is based upon the first five digits of the Work Order Number.
RER	The equation Replicate Error Ratio = (S-D)/[sqrt(TPUs ² + TPUD ²)] as defined by ICPT BOA where S is the original sample result, D is the result of the duplicate, TPUs is the total uncertainty of the original sample and TPUD is the total uncertainty of the duplicate sample.
SDG	Sample Delivery Group Number assigned by the Client or assigned by TestAmerica upon sample receipt.
Sum Rpt Alpha Spec Rst(s)	The sum of the reported alpha spec results for tests derived from the same sample excluding duplicate result where the results are in the same units.
Work Order	The LIMS software assign test specific identifier.
Yield	The recovery of the tracer added to the sample such as Pu-242 used to trace a Pu-239/40 method.

Sample Results Summary

Date: 25-Aug-16

TestAmerica Inc TA-RL

Ordered by Method, Batch No., Client Sample ID.

Report No. : 69207

SDG No: 51942

Batch	Client Id Work Order	Parameter	Result +- CSU (2 s)		Qual	Units	Tracer Yield	MDL	CRDL	RER2
6228062 RL-LSC-008										
	YMTFA39SE001(160-18504-1) M84A91AA CARBON-14		4.12E-02	+- 9.6E-02	U	PCI_G	100%	1.80E-01	1.00E+01	
	YMTFA39SE001(160-18504-1) DUP M84A91AC CARBON-14		8.24E-02	+- 9.9E-02	U	PCI_G	100%	1.81E-01	1.00E+01	0.6
	YMTFA40SE001(160-18504-2) M84CA1AA CARBON-14		5.72E-02	+- 9.6E-02	U	PCI_G	100%	1.79E-01	1.00E+01	
	YMTFA41SE001(160-18504-3) M84CC1AA CARBON-14		1.09E-01	+- 9.2E-02	U	PCI_G	100%	1.68E-01	1.00E+01	
	YMTFA73SE001(160-18504-4) M84CD1AA CARBON-14		8.20E-02	+- 8.7E-02	U	PCI_G	100%	1.60E-01	1.00E+01	
	No. of Results:	5								

QC Results Summary

Date: 25-Aug-16

TestAmerica Inc TA-RL

Ordered by Method, Batch No, QC Type,.

Report No. : 69207

SDG No.: 51941

Batch	Work Order	Parameter	Result +- CSU (2 s)	Qual	Units	Tracer Yield	LCS Recovery	Bias	MDL
RL-LSC-008									
6228062	BLANK QC,								
M84C41AA	CARBON-14		5.66E-02 +- 9.8E-02	U	PCI_G	100%			1.85E-01
6228062	LCS,								
M84C41AC	CARBON-14		7.32E+00 +- 5.1E-01		PCI_G	100%	105%	0.0	1.77E-01
No. of Results: 2									

TestAmerica Inc Bias - (Result/Expected)-1 as defined by ANSI N13.30.
 rptSTLRchQcSum U Qual - Analyzed for but not detected above limiting criteria, Mdc/Mda/Mdl, Total Uncert, RDL or not identified by gamma scan software.
 mary V5.6 A2002

FORM I
SAMPLE RESULTS

Date: 25-Aug-16

Lab Name: TestAmerica Inc
 Lot-Sample No.: J6H150411-1
 Client Sample ID: YMTFA39SE001(160-18504-1)

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDL, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6228082	RL-LSC-008			Work Order: M84A91AA		Report DB ID: 9M84A910						
CARBON-14	4.12E-02	U	7.7E-02	9.6E-02	1.80E-01	PCI_G	100%	0.23	8/19/16 08:30 p	5.1	LSC4	
No. of Results:	1	Comments:				8.76E-02	1.00E+01	0.86		g		

FORM I
SAMPLE RESULTS

Date: 25-Aug-16

Lab Name: TestAmerica Inc
 Lot-Sample No.: J6H150411-2
 Client Sample ID: YMTFA40SSE001(160-18504-2)

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDL, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6228082	RL-LSC-008			Work Order: M84CA1AA		Report DB ID: 9M84CA10						
CARBON-14	5.72E-02	U	7.7E-02	9.6E-02	1.79E-01	PCI_G	100%	0.32	8/20/16 12:37 a	5.1	LSC4	
No. of Results:	1	Comments:				8.70E-02	1.00E+01	(1.2)		g		

FORM I
SAMPLE RESULTS

Date: 25-Aug-16

Lab Name: TestAmerica Inc
 Lot-Sample No.: J6H150411-3
 Client Sample ID: YMTFA41SE001(160-18504-3)

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDL, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6228082	RL-LSC-008			Work Order: M84CC1AA		Report DB ID: 9M84CC10						
CARBON-14	1.09E-01	U	7.4E-02	9.2E-02	1.68E-01	PCI_G	100%	0.65	8/20/16 02:41 a	5.4	LSC4	
No. of Results:	1	Comments:				8.21E-02	1.00E+01	(2.4)		g		

FORM I
SAMPLE RESULTS

Date: 25-Aug-16

Lab Name: TestAmerica Inc
 Lot-Sample No.: J6H150411-4
 Client Sample ID: YMTFA73SE001(160-18504-4)

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDL, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6228082	RL-LSC-008			Work Order: M84CD1AA		Report DB ID: 9M84CD10						
CARBON-14	8.20E-02	U	7.0E-02	8.7E-02	1.60E-01	PCl_G	100%	0.51	8/20/16 04:45 a	5.7	LSC4	
No. of Results:	1	Comments:				7.78E-02	1.00E+01	(1.9)		g		

FORM II

Date: 25-Aug-16

DUPLICATE RESULTS

Lab Name:	TestAmerica Inc	SDG:	51942	Collection Date:	8/4/2016 9:00:00 AM
Lot-Sample No.:	J6H150411-1	Report No. :	69207	Received Date:	8/9/2016 12:45:00 PM
Client Sample ID:	YMTFA39SE001(160-18504-1) DUP	COC No. :		Matrix:	SOLID SO
<hr/>					
Parameter	Result, Orig Rst	Count Qual	CSU (2 s)	Rpt Unit, MDL-, Action Lev	Rst/MDL, Rst/TotUncert
Batch:	RL-LSC-008	Work Order:	M84A91AC	Report DB ID:	Orig Sa DB ID: 9M84A910
CARBON-14	8.24E-02 4.12E-02	U U	7.9E-02 RER2 0.6	9.9E-02 1.81E-01 PCI G 1.00E+01	0.45 (1.7) 8/19/16 10:34 p
					5.0 g

No. of Results: 1 Comments:

8/29/2016 A2002 **TestAmerica Inc** RER2 - Replicate Error Ratio = $(S-D)/[\sqrt{(sq(TPUs)+sq(TPUs))}]$ as defined by ICPI BOA.
prtSTLRchDUpV5. MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.
 U Qual - Analyzed for but not detected above limiting criteria, Mdc/Mda/Mdl, Total Uncert, RDL or not identified by gamma scan software.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----

FORM II**BLANK RESULTS**

Date: 25-Aug-16

Lab Name: TestAmerica Inc**Matrix:** SOLID**SDG:** 51941**Report No. :** 69207

Parameter	Result	Count Error (2 s)	CSU (2 s)	MDL, Lc	Rpt Unit, CRDL	Yield	Rst/MDL, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6228062 CARBON-14	RL-LSC-008 5.66E-02	U 7.9E-02	Work Order: M84C41AA 9.8E-02	1.85E-01 9.03E-02	PCI_G 1.00E+01	Report DB ID: M84C41AB 100%	0.31 (1.2)	8/20/16 06:48 a	5.0 g	5.0 LSC4	

No. of Results: 1 Comments:

FORM II

Date: 25-Aug-16

LCS RESULTS

Lab Name: TestAmerica Inc
Matrix: SOLID

SDG: 51941
Report No.: 69207

Parameter	Result	Qual	Count Error (2 s)	CSU (2 s)	MDL	Report Unit	Yield	Expected	Expected Uncert	Recovery, Bias	Analysis, Prep Date	Aliquot Size	Primary Detector
Batch: 6228062	RL-LSC-008			Work Order: M84C41AC		Report DB ID: M84C41CS							
CARBON-14	7.32E+00		1.7E-01	5.1E-01	1.77E-01	PCI_G	100%	6.97E+00	1.40E-01	105%	8/20/16 08:52 a	5.2	LSC4
No. of Results: 1	Comments:				Rec Limits:	75	125	0.0				g	

TestAmerica St. Louis

113715 Rider Trail North
Earth City, MO 63045
Phone (314) 298-8566 Fax (314) 298-8757

Chain of Custody Record

Sample Check-in List

Date/Time Received: 8-9-16 / 1245

Container GM Screen Result: (Airlock) cpm Initials [B]Sample GM Screen Result (Sample Receiving) cpm Initials [B]

Client: STLR

SDG #: 51942

SAF #:

NA []

Lot Number: 36H150411

Chain of Custody # 160-90448-1

Shipping Container ID or Air Bill Number: NA [B]]

Samples received inside shipping container/cooler/box

Yes [P] Continue with 1 through 4. Initial appropriate response.
No [] Go to 5, add comment to #16.

1. Custody Seals on shipping container intact?
2. Custody Seals dated and signed?
3. Cooler temperature: _____ °C
4. Vermiculite/packing materials is

Yes [] No [] No Custody Seal [P]
 Yes [] No [] No Custody Seal [P]
 NA [B]] Wet [] Dry [B]

Item 5 through 16 for samples. Initial appropriate response.

5. Chain of Custody record present?

Yes [P] No []

6. Number of samples received (Each sample may contain multiple bottles): 4

7. Containers received: 4 x 4 on jute

8. Sample holding times exceeded?

NA [] Yes [] No [B]]

9. Samples have: tape hazard labels custody seals appropriate sample labels

10. Matrix: A (FLT, Wipe, Solid, Soil) I (Water) S (Air, Niosh 7400) T (Biological, Ni-63)

11. Samples:

are in good condition are leaking are broken
 have air bubbles (Only for samples requiring no head space) Other _____

12. Sample pH appropriate for analysis requested

Yes [] No [] NA [P]

(If acidification is necessary go to pH area & document sample ID, initial pH, amount of HNO₃ added and pH after addition on table)

13. Were any anomalies identified in sample receipt?

Yes [] No [B]]

14. Description of anomalies (include sample numbers): NA [P]]

15. Sample Location, Sample Collector Listed on COC? *

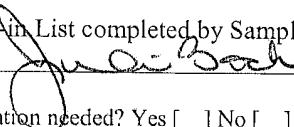
Yes [] No [P]]

*For documentation only. No corrective action needed.

16. Additional Information: N/A

 Client/Courier denied temperature check. Client/Courier unpack cooler.

Sample Check-in List completed by Sample Custodian:

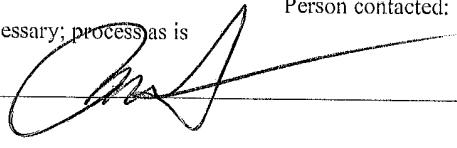
Signature: 

Date: 8-9-16

Client Notification needed? Yes [] No [] Date: _____

By: _____

Person contacted: _____

 No action necessary; process as isProject Manager: 

Date: 8-15-16